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ABSTRACT

This booklet discusses, in the context of low-income countries, a series of planning issues bridging education and communication. The planning issues include the democratization of educational opportunity, the quality of instruction and learning, the impact of education through technology on rural areas, and the participation of people in their own education. Each of these issues is discussed in light of evidence from four case studies and from other sources. Much of the text is devoted to four relatively successful applications of communication media for education and development. Three case studies involve the use of radio: extended learning in the Dominican Republic, qualitative improvement of mathematics teaching in Nicaragua, and community action in Tanzania. The fourth study looks at the experimental use of satellite television broadcasting in India. The authors show how cost estimates depend on the level of technology adopted and on the context of its use. Conclusions and recommendations for planners close the report. (Author/MLF)

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Fundamentals of educational planning

29

Communication media in education for low-income countries: implications for planning

Emile G. McAnany and John K. Mayo

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Fundamentals of educational planning

The booklets in this series are written primarily for two types of clientèle: those engaged in—or preparing for—educational planning and administration, especially in developing countries; and others, less specialized, such as senior government officials and policy-makers who seek a more general understanding of educational planning and of how it is related to overall national development. They are devised to be of use either for private study or in formal training programmes.

Since this series was launched in 1967 the practice as well as the concept of educational planning has undergone substantial change. Many of the assumptions which underlay earlier attempts to put some rationality into the process of educational development have been abandoned or at the very least criticized. At the same time, the scope of educational planning itself has been broadened. In addition to the formal system of schools, it now includes other important educational efforts in non-formal settings and among adults. Attention to the growth and expansion of educational systems is being supplemented and sometimes even replaced by a growing concern for the distribution of educational opportunities and benefits across different regions and across social, ethnic and sex groups. The planning, implementation and evaluation of innovations and reforms in the content and substance of education is becoming at least as important a preoccupation of educational planners and administrators as the forecasting of the size of the educational system and its output. Moreover, the planning process itself is changing, giving more attention to the implementation and evaluation of plans

as well as to their design, and exploring such possibilities as integrated planning, participatory planning, and micro-planning.

One of the purposes of these booklets is to reflect this diversity by giving different authors, coming from a wide range of backgrounds and disciplines, the opportunity to express their ideas and to communicate their experience on various aspects of changing theories and practices in educational planning.

Although the series has been carefully planned, no attempt has been made to avoid differences or even contradictions in the views expressed by the authors. The Institute itself does not wish to impose any official doctrine on any planner. Thus, while the views are the responsibility of the authors and may not always be shared by Unesco or the IIEP, they are believed to warrant attention in the international forum of ideas.

Since readers will vary so widely in their backgrounds, the authors have been given the difficult task of introducing their subjects from the beginning, explaining technical terms that may be commonplace to some but a mystery to others, and yet adhering to scholarly standards. This approach will have the advantage, we hope, of making the booklets optimally useful to every reader.

Preface

In this booklet, Emile McAnany and John Mayo discuss a field with considerable interest both to educational reformers and to educational planners: that of educational media. The area of educational media and technology is one which is considered as promising a great deal to those who seek for radical change in educational curricula and techniques, because of its multiplier effect and its apparent potential to produce and distribute quality materials. Yet at the same time, as the authors point out, this potential has rarely been realized, and hopes of massive educational reform through the media, which were relatively widely held in the 1960s, have now been tempered by practical experience. Partly, they argue, this is because the preliminary analysis and needs assessment required to select relevant technologies and to plan for their utilization have rarely taken place; also because the initial level of investment required is usually high and the technologies involved difficult to discard or adapt if they fail to work out.

The cost factors involved in planning for educational technology systems and the difficulties involved in assessing them have been examined in an earlier booklet in this series, and in a book published later by Unesco.[1] In this study the authors show how cost estimates depend upon the level of technology adopted, and upon its context of use. Secondly, although the original emphasis

1. Jamison, Dean, *Cost factors in planning educational technological systems*, Paris, Unesco/IIEP, 1977 (Fundamentals of educational planning, No. 24); Unesco, *The economics of new educational media*. Vol. I: Present status of research and trends; Vol. II: Cost and effectiveness. Paris, Unesco, 1977, 1980.

of educational mass media was upon widespread diffusion, an emphasis amenable to cost-benefit analysis, the focus has increasingly been turned towards qualitative factors, which are much less easy to evaluate in economic terms.

In spite of disappointing experiments there is a growing range of examples of systems which exploit educational technologies, including many in the developing world. Some may have been introduced for reasons of fashionable interest — some have certainly been introduced as acts of faith, as communication is a field which attracts very devoted adherents. But experience on the ground has revealed a large number of media possibilities, embracing a variety of educational needs and objectives.

Much of the text is devoted to four short case studies, covering the use of radio for extended learning in the Dominican Republic ; qualitative improvement of mathematics teaching in Nicaragua ; community action involving radio in Tanzania ; and the experimental use of satellite broadcasting in India. Explicit in the booklet's title is the use of communication media for low-income countries, with a critical eye to cost considerations. But it is interesting, and not at all surprising, to see that the focus of the studies, in all cases but that of India, is upon radio rather than television, as a lower-cost broadcasting alternative. More than anything, this reflects a situation in which technological choice is made more directly than hitherto in relation to overall educational planning and financing, paying special attention to criteria of cost-effectiveness, even though these are more flexibly interpreted than in the past.

The focus of the booklet is therefore upon the potential of educational technologies as correlated with specific educational policy objectives : in extending educational opportunity ; improving the quality of teaching and learning ; developing rural areas ; and — still a fluid sphere — the increase of participation. What is emphasized, above all, is the need for careful planning and analysis in association with educational specialists from many fields, to envolve media systems and applications which are coherent and which do not exceed the financial possiblities of the country. The booklet is, therefore, of interest not simply to those concerned with media, but also to planners and administrators in other educational fields : it is part of the broader debate on innovation, not a piece of special pleading.

Michel Debeauvais, *Director, IIEP*

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Introduction

In keeping with an expanded concept of education and the variety of activities now subsumed under such a concept, the roles and expectations surrounding the uses of communication media have broadened considerably in recent years. It is no longer accurate to limit a discussion of communication media exclusively to the realm of ancillary aids to the learning process. The trend towards systemic educational planning, planning involving a wide variety of resources and clientele, prevails in most countries as well as in the numerous international organizations working to diffuse educational innovations of all kinds. This trend also implies a purposeful and integrated approach to the use of communication media.

Some of the most interesting projects and experiments involving communication media haven taken place in areas where the educational needs appear most pressing and where traditional educational resources such as schools, trained teachers, and learning materials of all kinds are in the shortest supply. Yet, the performance of the media to date in various educational reform and development projects has not been uniformly successful. Many projects have been launched, but few have survived long enough to demonstrate the scale or quality of impact that their originators and administrators had initially anticipated. Far too often, the vision of what the media could accomplish in education has not been preceded by adequate analyses of the specific educational problems that were to be addressed or by a proper delineation of the roles the media could most productively play. Even when such preliminary work has been done, logistical and administrative problems have frequently undermined the effectiveness of media-based pro-

grammes at the local level. For these reasons, even the most optimistic advocates of communication media have become more cautious in their assessment of what these tools can do.

We have entered an era of reassessment and realism in which the widely agreed-upon potential of the media is counterbalanced by a deeper appreciation of the complexity and pervasiveness of the obstacles to change. The media still hold a compelling attraction for planners hoping to make a major impact in education in a relatively short time. Unlike some of their predecessors, however, the current generation of educational planners realize that, to be successful, any programme must surmount the persistent political, social and economic forces that have undermined so many of their efforts in the past.

In this paper we will discuss, in the context of low-income countries, a series of planning issues bridging education and communication. We begin by attempting to clarify some of the underlying assumptions and defining the limits of the issues to be treated.

I. Some assumptions

In the past two decades, communication media have spread throughout the world and created a network of interconnectedness among almost all nations. Table 1 illustrates both the extent of this growth

TABLE 1. Mass media change in low-income countries: 1963–73
(units per thousand inhabitants)

Region	Radio receivers	Television receivers	Daily newspaper copies	Cinema seats
Africa				
1963	32	1	10	6
1973	54	4	14	4
Percentage change	+ 69	+ 300	40	− 33
Asia				
1963	12	1	17	8
1973	41	4	20	6
Percentage change	+ 242	+ 300	+ 18	− 25
Latin America				
1963	104	22	73	34
1973	171	68	62	22
Percentage change	+ 64	+ 209	− 15	− 35

Sources: Unesco statistical yearbook (1975) and *World communications* (1975).

as well as the rate at which it accelerated in the low-income countries of Asia, Africa and Latin America between 1963 and 1973. Beginning with newspapers, film and radio, then with television and today with computers, satellites and other sophisticated delivery systems, modern communications have been thrust into almost every corner of the world. The rapid and largely unplanned spread of these technologies has generated a series of reactions from many countries. Some are alarmed by the increasing attention people are paying to these media and the kinds of cultural and political messages they convey. Low-income countries and even industrialized countries are concerned about possible negative effects of these messages on adults as well as on children. Unesco has undertaken a study of the problem and will soon issue a report on the current status of international communication.[1]

Just as radio spread rapidly during the years after 1960 when transistors made cheap portable radios a possibility for many people even in poor rural areas, television is now spreading throughout many areas of the world. Today television vies with both schools and the family as a socializing force on the young (Halloran, 1976). Children in the United States actually spend more time in front of the television set than they do in the classroom; so much time, in fact, that educators and parents are beginning to wonder whether the informal learning of this experience does not outweigh the impact of school. The reaction of educators in many cases has been either to blame the mass media for many of the problems that schools are experiencing or to turn to the media as a panacea for the task of educating the young. In each of these reactions there is a common underlying assumption, i.e. that the mass media have a direct and overpowering influence on their audiences. One purpose of this paper is to examine such an assumption in the light of the evidence that is now available on the impact of communication media when applied to education.

It is necessary at the outset to note that value judgements and empirical data each play a part in analysing the multiple roles which the mass media have been assigned both in and out of school. Any evaluation of the media must ultimately rest on a series of values that the society and the schools embody, and the job of interpreting

1. An interim report was issued in October 1978: International Commission for the Study of Communication Problems, *Interim report on communication problems in modern society* (Paris, Unesco, 1978). A final report will be published in 1980.

the empirical evidence concerning their impact on learning, and education generally, must ultimately be made in the light of these values (McAnany, 1978).

Without delving deeply into the general issue of technology transfer, we can identify three aspects of the subject that apply to the study of educational media.[1] These are determinism, dependency and costs. The first assumption concerns the widely shared notion that the growth of modern communication technology is inevitable and that its application to a wide variety of problems will help all societies to 'progress'. The assumption of linear and uniform progress in development that is often related to such an attitude frequently does not square with the uneven development patterns which many nations exhibit.[2] A related and equally dangerous assumption is that particular technologies have no history and no historical context and that they are therefore easily adapted to new problems and circumstances.

A second general issue concerns the socio-political consequences of all technology transfers. The essential question here is the degree to which the control maintained over a particular technology by the exporting nation (through patents, proprietary information, personal expertise, etc.) affects the autonomy and decision-making ability of importing nations. Does a technology which may have proved cost-effective in the exporting nation cost more than it is worth for the importing nation?

The problems of technological determinism and dependency in the transfer of the communication media are just beginning to draw the attention of scholars, although there are strong historical parallels with industrial technology (OAS, 1977). In communication technology, however, the concern has both hardware and software

1. For a recent account of technology transfer and its problematic rôle in development see Denis Goulet, *The uncertain promise: value conflicts in technology transfer* (New York, N.Y., IDOC/North America, 1977). There is beginning to be an examination specifically of the transfer of educational technology in conferences but the published literature is as yet scarce. See the conference report (in Spanish) of the Seminar on the Transfer of Technology in Education (OAS, 1977) with presentations on 'The idea of transfer of educational technology', 'The impact of the transfer of technology in education' and 'Problems that the transfer of technology generates' (OAS, 1977).
2. There are a number of treatments of this but a recent book that summarizes the experience well is Michael Harrington's *The vast majority* (New York, N.Y., Simon & Schuster, 1977).

dimensions. As the hardware becomes more sophisticated, it often creates among recipients a dependency on those advanced countries that have the technical knowledge to install and maintain it. At the same time, it may create a dependency on management techniques and skills that are vital to its success. The software dependency at first does not seem critical, since it is assumed that countries know what they want to teach and only require the new media to facilitate more efficient dissemination. Two dangers must be recognized here, however. Because communication media can place such great demands on curriculum planners to produce material to satisfy recently installed technologies, there is often a great temptation to purchase ready-made or slightly adapted lessons from producer countries. A related problem is the growth of large transnational companies that specialize in pre-packaged information and software in the form of videotapes, films and accompanying printed material which may be available at costs substantially lower than locally produced equivalents (Katz and Wedell, 1977; Mattelart, 1976; Varis, 1975).

Finally, communication strategies in education are often adopted on the assumption that a cost-effectiveness model with its view of education problems as primarily quantitative offers planners the best basis for good decision-making. We question whether the problem of cost in technology has been adequately grasped by both planners and policy-makers. This problem has been discussed increasingly over the past five years (cf. Jamison, Klees and Wells, 1978; Unesco, in press; Carnoy, 1975) but solutions are far less clear-cut and simple than many planners, grasping for quick solutions to difficult problems, would like to admit (Eicher, in press). A peculiarity of almost all communication technology transfers is that they characteristically demand a high initial investment, making it difficult if not impossible to experiment with or to discard the system after an initial trial. Although the cost problems of technology have been discussed in a previous volume in this series (Jamison, 1977), readers should keep in mind this problem in thinking about the cases presented in Chapter III.

II. A planner's approach to communication media

The process of education planning has undoubtedly become more complex over the past two decades, especially in low-income countries where problems are enormous and resources relatively scarce. A decade or more ago the problems seemed more straightforward and communication media were considered an important means for seeking to improve and expand education. (Wilbur Schramm and colleagues provided a planning guide to the new media for Unesco in 1967; cf. Schramm *et al*, 1967; Unesco/IIEP, 1967.) Today, there has been increasing emphasis on political-economic aspects of planning (Hallak, 1974) as well as the 'non-rational' elements of educational systems, such as the clash of group or class interests, bureaucracy, and political party interests in policy-making (Levin, 1978; Carnoy, 1978; Stanford Evaluation Consortium, 1977; Hancock, 1977). Nevertheless, planners are confronted by the fundamental challenge of trying to guide decision-makers in the best use of available resources to solve concrete educational problems of the country or region where they are working. If the planner's aim is to optimize the use of resources in an attempt to solve concrete problems, then what is needed is a knowledge not only of the problem but also of some alternatives for solution.

When the work of the educational planner is looked at comprehensively, a threefold process emerges: planning and design (in which the planner examines problems and alternative solutions, then chooses one and details this design); implementation of the design (where the planner looks at administrative, political and other obstacles to implementation and suggests some solutions); and evaluation (where the planner looks carefully at consequences in

TABLE 2. Communication media and internal and external efficiency in formal and non-formal education

	Internal efficiency Sample short-term objectives	*External efficiency* Sample long-term objectives
FORMAL EDUCATION	Provide quality instruction/ learning	Implement education reforms
	Improve learning	Improve employment opportunity for educated
	Increase access to education by different strata/ classes	Raise productivity of citizens
	Reduce unit cost of education	
NON-FORMAL EDUCATION	Sensitize to problems	Improve agricultural production and productivity
	Motivate to study and action	Improve income
	Spread knowledge of innovations	Improve health, nutrition, family-planning practices
	Teach simple skills	Improve alternative employment opportunities
	Help co-ordinate delivery of educational services	Improve general quality of rural life

the hope of improving the system's effectiveness).

Table 2 presents in a schematic way some of the goals that planners seek in both formal and non-formal education. In categorizing those goals that are most relevant to what communication media can help to achieve, we have also distinguished between shorter- and longer-term objectives. Shorter-term educational objectives are customarily pursued by applying innovations and then observing their immediate consequences for participants in learning, skills acquisition or change in attitudes. These generally are the main focus of evaluations of educational technology.

The longer-term objectives, however, are the ones which planners often deal with, and they are frequently the ones cited to justify large media investments. The problem is that the consequences do not appear for years and often cannot be evaluated with any degree of precision (Lenglet and McAnany, 1977). Longer-term evaluations of such goals are often not performed as a consequence.

An additional problem is that planners must often reconcile two

sets of goals: political ones used to gain support for a project among decision-makers and the public; and programme goals, that is, what the project leaders hope to accomplish. Thus, *Sesame Street* was promoted (in the United States) originally on the basis of a long-term goal of reducing learning gaps between the advantaged and disadvantaged children. Subsequent evaluations, however, concentrated on the short-term goals of general learning gains for the whole audience with minimal attention to whether the gaps were being reduced (Cook *et al.*, 1975). In the cases we present in Chapter III, the shorter-term goals have often been attained with some degree of success. Educational planners will note, however, scant evidence concerning longer-term outcomes.

In addition to defining goals and objectives, planners also examine alternative means for achieving them. The choices among media for solving different educational problems are neither simple nor self-evident (Hawkridge, 1977), as some educational technologists would have us believe. Customarily, the planner must consider the appropriateness of communication in terms of educational goals to be pursued, the costs of the media technology, its complexity and the social and political constraints of each context.

Implementation of even carefully developed plans creates still another set of problems for planners. When, for whatever reason, deadlines are viewed as absolute, communication technology can play an almost tyrannical role within an educational project, for once broadcasting networks are on the air they must have something to say. Resulting problems have been detailed in the evaluations of large-scale television projects (cf. Mayo and Mayo, 1971; Grant, 1977), but no number of case studies can give planners adequate protection against the demands of their particular situation.

Since evaluation is now widely recognized as an important part of planning, it is incumbent upon planners to be acquainted with the variety of programme evaluations that have accumulated in the past decade (Bates and Robinson, 1977; Jamison and McAnany, 1978; Schramm, 1977). Once the design for incorporating the mass media in an education project has been created, planners must also create mechanisms for evaluating the performance of those media to determine both how they might be better utilized in the short run (formative evaluation) and how effectively they are contributing to the realization of project goals (summative evaluation).

III. Four cases of communication media applied to education

In this section we focus on four relatively successful applications of communication media for education and development: the extension of learning opportunities; the improvement of the quality of instruction; the diffusion of innovations; and the mobilization of people for civic action. The cases reviewed here were selected because each one has employed communication in a major way. Together, they also exemplify what communication media are apt to be relied upon to do in education in the years ahead. At the same time, they reflect the problems of acceptance, growth and endurance that will continue to challenge the planners and administrators no matter what their educational philosophy or goals.

Extending learning opportunities: Radio Santa María in the Dominican Republic

The pressures to expand and democratize educational opportunity have increased worldwide in recent years. Fuelled in part by the population explosion and in part by the need of nations to prepare people for jobs in ever more complex and interdependent societies, planners are seeking strategies that will not only make education available to greater numbers of people, but also education that will not demand the level of investment and administrative support customarily associated with schools.

If education is to meet the needs of different kinds of people, people who for one reason or another may never have entered a school or received any kind of formal instruction, it is clear that

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alternatives to the highly structured and immobile nature of most school systems must be developed. To a significant degree, the interest in 'lifelong learning' and distance teaching strategies[1] represents people's desire for opportunities that are sufficiently flexible to accommodate them, no matter what their age, sex, physical location or previous educational experience.

The mounting interest in alternatives to traditional forms of education should not be interpreted as a rejection of what schools do, however. The graduation diploma and school-leaving certificate still rank among society's most sought-after rewards and are likely to remain so. It is also clear that, at least for the foreseeable future, schools will continue to assume the major role in preparing the young for adult life. What is needed, therefore, are mechanisms that extend the benefits of education beyond schools in order that a broader spectrum of people, old as well as young, rural as well as urban, can take part.

The notion of extending educational opportunity beyond the school is not new. In his review of the various roles assigned to the mass media in education, Schramm (1977) documents a long-standing interest on the part of some countries in extended education, or what is now more commonly referred to as 'distance teaching'. Planners, Schramm writes, can 'look back over a long history of evening classes, correspondence study, agriculture and home economics extension, and other services designed to share educational resources widely' (p. 198). In countries where there exists a reliable postal service, correspondence study has generally taken root in one form or another. Yet, despite its extending quality, correspondence study has always had to contend with isolation of its students, the absence of a rigorous enough schedule or enough intrinsic incentives to keep them working and, as a result, an attrition rate often exceeding 75 per cent of initial enrollees. Where no alternatives for education exist and where the motivation to learn is high, the probabilities of students dropping out are reduced. However, even when such conditions exist, the ability of people to complete correspondence courses is frequently undermined by their lack

1. A book of case studies on distance-learning strategies in more formal education structures in Third World countries is being prepared by the World Bank and the International Extension College of the United Kingdom. It covers cases in Brazil, Colombia, Kenya and the Republic of Korea, among others. It is entitled *Alternative routes to formal education: formal education for school equivalency* (Ed. Hilary Perraton; Baltimore, Md., Johns Hopkins University Press, in press).

of experience with such a learning format and the impossibility of overcoming obstacles when they arise. This is particularly true for relatively isolated, rural populations which have had limited or no previous education. To overcome such handicaps, distance educators have tried to lessen the 'distance' between themselves and their students by providing a range of other services and activities which enhance involvement as well as the opportunity to diagnose and deal with problems before they become so severe as to cause the student to abandon the course. To a degree, such methods reinsert a modicum of institutional control into the correspondence format. One particularly good example of such a project is Radio Santa María in the Dominican Republic.

Project origin and rationale. In the Dominican Republic, the Spanish-speaking nation which shares the Caribbean island of Hispanola with Haiti, are exhibited most of the development dilemmas facing Latin America as a whole. Despite a promising annual growth rate of almost 10 per cent in the late 1960s and early 1970s, the Dominican Republic is still confronted by a relatively high rate of population growth (approximately 2.9 per cent a year), economic dependency on few prime extractive industries (notably sugar, cocoa, tobacco, nickel and bauxite), and a sharp disparity between the employment opportunities and rewards available to its urban versus its rural populations. In real terms, the Dominican Republic's rural population, which has always constituted the nation's most underprivileged sector, has seen its economic position eroded in the last generation. New opportunities and services have not been distributed uniformly either by the government or the private sector. As a result of deteriorating conditions in the countryside, a sharp increase of urban migration has occurred. The government has inaugurated a number of economic and educational policies aimed at slowing, if not reversing this trend but it is by no means certain that such initiatives will weaken the forces of inequality that are deeply rooted in the country's social system.

In the minds of the Dominican Republic's leaders, one promising strategy for closing the gap between the urban and rural sectors is educational reform. Accordingly, steps have been taken in recent years to make four grades of education universally available, to minimize grade repetitions and in so doing to enhance system efficiency, to revise the curriculum and generally to prepare young

people better for careers in technical fields and the professions. The emphasis on young persons enrolled in school represents only a partial solution for the Dominican Republic's pressing educational problems, however. While enrolments of the school-age population at all levels continue to expand, hundreds of thousands of older citizens and school leavers must survive without the necessary skills and credentials to find productive work. It is to this population that the Radio Santa María project is addressed.

Radio Santa María was founded in 1956 by Jesuit priests in the north-central Cibao region of the Dominican Republic. In its early years it transmitted primarily cultural and religious programmes in support of the local Roman Catholic diocese. Following the example of Acción Cultural Popular (ACPO), Colombia's radio-based non-formal education movement also founded under Church auspices, Radio Santa María's leaders launched a radio literacy programme in 1964. In the succeeding six years, a total of 25,459 adults participated in the radiophonic school movement and received literacy certificates.

When Father Antonio Cabezas became director of Radio Santa María in 1970, a major reassessment of the station's programmes was again undertaken. The reassessment produced a major change of policy and one that has guided the organization ever since. From the review of the educational needs of their predominantly rural constituency, Father Cabezas and the other leaders of Radio Santa María concluded that their energies could be better directed towards the establishment of a distance-learning, school-equivalency programme for grades one to eight and away from the diffuse cultural programmes and literacy training. Concluding that completion of an accelerated programme of basic studies through to the eighth grade would substantially enhance the technical skills of young rural people and thereby qualify them for careers in agriculture and industry, Radio Santa María's leaders developed a new distance-learning system. The clientele of the system and its principle components are described below.

Audience characteristics. According to Robert White, who completed a detailed case study of Radio Santa María for Unesco in 1976, yearly enrolments in the system have averaged 12,000 to 13,000 annually since 1973. Rural teenagers make up the bulk of the system's participants. These young people are drawn heavily

from rural communities where educational opportunity has not been available beyond the first two or three years of primary school. For these students, Radio Santa María offers the only means by which they may continue their education, short of moving to a larger town and finding a place in one of the few adult-education programmes offered by the government. Preferring to stay at home with their families, most of the students enter the system at the fourth-, fifth- or sixth-grade level. A majority have not been out of school for more than three years and 30 to 40 per cent have not yet celebrated their fifteenth birthdays (White, p. 19).

Survey data collected by White suggest that the clientele served by Radio Santa María in most respects parallels that served by the adult primary-school equivalency programme administered by the Secretariat of Education. Both programmes cater predominantly to young persons anxious to pursue their education beyond the basic three- or four-year minimum offered in many parts of the country. The desire to qualify for higher education and eventually for better-paying jobs in the urban sectors are the motives which White attributes to the high level of interest and motivation exhibited by Radio Santa María's participants. Education beyond the basic primary grades is apparently viewed by many rural adolescents as the best means available for securing a life off the family farm.

The learning system. The key element of Radio Santa María's learning system is the weekly set of printed lessons which are distributed to each student. These consist of six to eight printed sheets which contain both explanatory material and exercises derived from the national curricula for the respective grades. Two noteworthy modifications are made in the national curricula, however. First, the amount of time each student is expected to spend on each subject unit is reduced. This permits each course, fifth-grade mathematics for example, to be covered in a little less than six months. Second, the contents of most subjects for a given grade are organized around 'central themes'. These themes are expected to help the students integrate what they have been studying in different subject areas and, at the same time, raise their social consciousness. Wherever possible, topics of current national concern are woven into the development of the semester's 'central theme'.

The principle of active student involvement, exemplified by the daily exercises which the students are required to complete in each

subject, is reinforced by the use of radio. In the broadcast 'classes', which run for an hour each day, straight exposition by a single voice is avoided. Instead, a conversational format is customarily employed in which one actor poses the kinds of questions that the students are likely to have in the field. A second actor plays the helpful teacher, encouraging the student and helping to clarify the latter's doubts. In White's view, 'This helps to create an atmosphere of the active student posing questions, discovering the answers, and building a logical pattern of thought' (p. 32).

Involvement of the students is further enhanced by regular contact with a field teacher. Such teachers, who numbered 520 when White conducted his study in 1976, maintain the crucial link between the students and the central office. In addition to performing routine administrative duties such as enrolling new students, collecting fees and overseeing all examinations, the teachers hold weekly sessions for all students within their designated sectors. At these sessions, students are encouraged to bring up problems they have encountered with the previous week's instruction and receive feedback based on their completed exercise sheets. In addition, the more dedicated and skilful teachers often provide some supplementary instruction in one or more subject areas. Occasionally, the weekly meetings are used for more in-depth discussion of the central themes.

Although the field teachers receive some compensation (approximately $0.15 per student per week) for carrying out the duties outlined above, community spirit and religious values appear to explain better their dedication to the system. Most of the teachers are young persons (median age 23.5) who are still pursuing their own education, mostly at the secondary level. Approximately one-third are primary school teachers, but the majority have no teaching credential and are not formally recognized as teachers by the Dominican Republic's Secretariat of Education. However, what the young teachers lack in formal education and training they appear to make up in dedication to their students, to the radio system and to the principles of lifelong education. In many respects, the teachers serve as role models for their students because they share so many of the latter's background characteristics and aspirations.

Scale and duration of impact. One of the most difficult problems

facing distance-learning systems is the maintenance of contact between the centre and the field. Without up-to-date information on how well elements of a system are distributed and used, the danger is increased that learning performance will suffer and that participants will eventually abandon the system. As mentioned above, Radio Santa María relies upon a unique corps of 520 field teachers to provide a feedback to the central administration. Such feedback consists primarily of weekly reports submitted by the field teachers and, as White's study points out, one of the best indicators of field-teacher effectiveness is the regularity and thoroughness of such reports. Additional feedback is provided by a small cadre of supervisors who attempt to visit all the sectors on a rotating basis. However, the ration of supervisors to sectors is too low to permit much in the way of direct or regular monitoring of the system as a whole. The supervisors, instead of observing or training field teachers, are forced to spend most of their time in sectors where crises have arisen either through the absence or negligence of field teachers.

In an effort to obtain a more representative and objective assessment of Radio Santa María's performance, White compared the achievement levels of students in the radiophonic schools with those in conventional adult-education classes. Demographic as well as achievement test data were collected from samples of sixth- and eighth-grade students to test the hypothesis that students enrolled in Radio Santa María's programme learn at a level equal to or greater than that of their counterparts in the conventional system. Additional data were collected from samples of graduates of the two systems to test the hypothesis that graduates of Radio Santa María rank equal to or above the average of their secondary-school classes.

Although the limited size and non-random-sampling strategy of White's study prevented him from drawing anything more than tentative conclusions from his data, he felt that both his hypotheses were substantiated and that Radio Santa María was offering a comparable, indeed superior, education to that of the conventional system. Perhaps even more important than White's summative judgements, however, were the conditions and qualifications he identified with respect to Radio Santa María's operations.

Chief among White's concluding observations was the critical importance of the local field teacher. When field teachers were

present and working adequately, students enrolled in the Radio Santa María system outperformed their counterparts in the conventional adult-education programme. Achievement in mathematics seemed to be especially dependent on regular field-teacher contact, as did the overall academic performance of rural students.

If the viability of Radio Santa María's learning model and its cost-effectiveness are to be preserved, it is apparent from White's analysis that field-teacher weaknesses must be remedied. Specifically, methods must be improved for diagnosing and correcting individual students' learning difficulties. This may be possible through better use of the weekly learning sheets and strengthening of the elements of the system. Improved training and supervision of the field teachers themselves will also be required. Can such improvements be made within what amounts to a quasi-volunteer teaching force? How much might the nature of that force have to be transformed to insure its continuity and an improved performance in the field? Teacher costs already comprise the single greatest outlay of Radio Santa María and it is unclear how much higher such costs can climb relative to other elements of the system. How Radio Santa María's leaders resolve the problems associated with field-teacher performance and responsibility will probably determine more than any other single factor the success of their system in the years ahead. In this respect, the criteria eventually adopted for balancing innovative teaching tools such as radio with traditional educational resources such as trained teachers may provide the planners of future projects with useful guidance.

Improving the quality of classroom instruction: the Nicaraguan Radio Mathematics Project

Project origins and rationale. In 1973, the Institute for Mathematical Studies in the Social Sciences at Stanford University, with financial backing from the United States Agency for International Development (USAID), launched a project to test the instructional effectiveness of radio as a means for teaching mathematics within primary schools of developing countries. Based on extensive project work in the United States, the Stanford researchers were confident that elementary mathematics curricula could be adapted to radio. However, neither the limited research literature on the subject nor their previous experiences could justify such confidence in other

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countries, particularly developing countries where critical human and material resources are often in such short supply.

The first year of the project was spent selecting a suitable site for the experiment. Twelve countries were identified initially and each of these was reviewed according to pre-established selection criteria. As a group, the twelve demonstrated certain conditions that are found throughout the developing world as well as in some of the remote, rural areas of developed countries. These include: shortage of qualified teachers, a lack of textbooks and other learning materials, reliance on curricula that are not well suited to the experiences and needs of students, and student populations that lack the necessary basic skills to perform at given grade levels. These factors frequently combine to create severe handicaps for teachers and students and they perpetuate the excessively high repetition and drop-out rates that characterize so many primary education systems in the world today.

Having reviewed the status and interest of the various candidate countries, the Stanford-USAID selection team ultimately settled on Nicaragua, the small Central American nation of approximately 2.5 million people. Despite its oppressive political system, and one that weakened steadily over the course of the project, Nicaragua possessed certain attributes that made it a particularly attractive site to mount the radio mathematics experiment. In the first place, it had no existing system of in-school radio instruction. This meant that the new project would not be forced to compete with an established programme, public or private. Second, all classes in Nicaragua are taught in Spanish, the national language. This fact eliminated the potential problem of having to carry out radio instruction in more than one language. The task of conducting instruction in multiple languages has created major administrative and pedological problems for educational broadcasters in other nations. Finally, and perhaps most important, the Government of Nicaragua was willing to lend the project some support in the form of local staff and facilities. This level of commitment, coupled with the fact that Nicaragua had two years previously undertaken a major reform of its primary mathematics curriculum, meant that the radio project would not have an uphill battle to gain official acceptance or backing.

Audience characteristics. Although the Stanford team began the

project with considerable experience in constructing primary mathematics curricula, they had never worked with radio. Furthermore, they knew precious little about Nicaragua and its educational system. To eliminate such gaps, in the first year of the project a great deal of effort was put into studying the potential audience as well as existing instructional procedures to determine what factors would have to be taken into account in the adaptation of Nicaragua's mathematics curriculum for radio.

In order to gain essential information about Nicaraguan primary-school students and particularly their levels of performance in traditional mathematics classes, the Stanford researchers developed a diagnostic achievement test which was administered to a sample in Masaya District of thirty first-grade classrooms, stratified by level of urbanization (e.g. urban, municipal and rural). A battery of test items was constructed from existing curricular objectives and administered in such a way that students were required to respond to different subsets of items. This permitted the researchers to obtain information on a larger number of concepts and operations than would have been possible had each student been required to respond to the same items.

The test results indicated that Nicaraguan first-graders were not attaining the learning levels in mathematics that had been established by the curriculum. The conceptual aspects of the curriculum were found to be more difficult for the children than the computational aspects, and exercises presented orally proved to be easier than comparable exercises presented in written form. A somewhat surprising finding was similarity in performance between children from urban, municipal and rural schools. Although this result contradicted the conventional wisdom and research from other nations regarding the disadvantaged status of rural children, it could be explained by the relative insignificance of urban–rural differences in such a small country as Nicaragua and/or by the fact that rural students were found to be on the average 0.3 years older in first grade (8.5 versus 8.2). In any case, with the survey and testing data in hand, the Stanford team had established a workable baseline upon which they could begin building their instructional programme.

The learning system. Relying on a precisely defined model of curriculum development, the radio project assumed responsibility for

all the mathematics instruction children received in the experimental classes. Emphasis was placed on the need for contact interaction between students and the daily radio broadcasts. Each day the students received a half-hour radio broadcast followed by a set of activities directed by the classroom teachers.

The radio lessons were broken down into instructional and entertainment segments, with each segment consuming between two and four minutes of broadcast time. Throughout the broadcasts, the children were expected to participate actively. Time for oral, written and physical (clapping, raising hands, etc.) responses was built into each broadcast and, over the course of the project, the project leaders continually increased the number of such responses, sensing they were the key to holding student attention and reinforcing learning. Over time, the early reliance on stories as a motivation device was abandoned by the researchers as they discovered that the mathematical activities were intrinsically interesting to the children as long as they were asked to respond frequently (an average of five times per minute during the course of each broadcast).

The project provided no textbook. In the pilot year, one-page worksheets were produced to accompany the first-grade broadcasts. These were retained in subsequent years for the first-grade programme. However, because a major objective of the project was to provide effective instruction at the lowest possible per-student cost, worksheets were not distributed for the second- and third-grade programmes. Instead, in these grades students were instructed to use their workbooks for all written work. Use of the blackboard was also played down; when drawings were called for, the radio teachers simply asked the students to make them in their notebooks. In the same spirit, classroom teachers were asked to provide sticks or other locally available objects whenever support materials were needed to reinforce concepts presented in the lessons.

The classroom teacher was responsible for seeing to it that the children received the daily radio broadcasts and that appropriate follow-up activities were conducted. To assist the classroom teachers with these tasks, the project provided a teacher's guide containing three or four pages of instructions about what should be done before, during and after each broadcast lesson. As the project grew, the role of the classroom teacher changed somewhat. Although the radio component was initially designed to compensate for teacher

weaknesses and for the considerable variability among teachers in terms of their knowledge of mathematics, it was discovered that enthusiastic classroom teachers made a big difference. In the first grade, effective classroom use of radio required teachers frequently to assist students with the exercises contained in the worksheets. In the higher grades, the role of the classroom teacher was reduced somewhat in light of the teachers' need to manage students in two or more grade levels simultaneously. However, teachers at all levels were encouraged to intervene when they sensed students were having difficulty with the radio lessons.

One of the most significant innovations made by the project was in the area of feedback. Traditionally, media projects have relied upon a 'develop—try out—revise' strategy to devise and implement new curricula. Such a strategy was used initially in Nicaragua to establish the basic format for the radio lessons. However, once the daily broadcasts began, the researchers realized that they could no longer rely on the traditional feedback strategy; it was simply too cumbersome and required too much time. What they needed was a method for obtaining precise and rapid measures of student performance *and* a production schedule flexible enough to allow such information to be incorporated into the development of future lessons. In this manner they could identify problem areas, provide remediation and enhance student achievement.

The feedback information came from various sources: weekly tests, classroom observations and teacher comments. Together they helped shape all aspects of the radio lessons; from the speed, length and vocabulary of the programme segments to the weighting of instructional time allocated to different concepts and the kinds of responses demanded of the children.

The design of the Nicaraguan Radio Mathematics Project embodied clear psychological principles of instruction that guided the project's approach to all elements of the teaching system. These principles (see Table 3) were spelled out by the project's leaders along with the implementation strategies that were developed from them.

Scale and duration of impact. From the outset of the Radio Mathematics Project, the Stanford team and their sponsors within USAID wished to determine how effective radio could be in the instruction of primary mathematics within a developing country. Specifi-

TABLE 3. Learning principles and implementation strategies for radio mathematics in Nicaragua

Principles	Implementation strategies
Children learn by doing.	All instruction is in the context of exercises and tasks.
Active responding enhances learning.	Children talk or write or respond physically throughout each radio programme.
Knowledge of results enhances learning.	The correct answer is given after each exercise.
Distributing practice over sessions is more effective than concentrating it in a short period of time.	Each topic is practised many times at intervals during the year.
Children retain concepts better when they understand them.	Each topic is carefully developed and presented in small steps.

Source: Searle, 1978.

cally, they hoped to determine whether student achievement levels could be improved through a radio-based strategy and whether the costs of such a strategy could be kept within the financial limitations of most developing nations. On the basis of the comprehensive research programme conducted in Nicaragua, the team concluded that radio was indeed a cost-effective medium for teaching primary mathematics and probably other subjects as well.

Because improvement in student achievement was the prime goal of the project, tests were administered continually throughout the project's early years. As reported above, such tests served important diagnostic and feedback functions as well. The yearly gains were viewed as the critical indicator of project success. To measure yearly gains, the researchers employed a pre-test/post-test design, comparing the performance of students in radio classes with students in traditional classes. To ensure that comparable groups of students would be studied, a randomized field design was employed; that is, schools were assigned randomly to radio (experimental) or non-radio (control) classes.

In 1977, the last full school year for which full test results are available, significantly higher achievement levels were recorded by students in the radio classes. For example, the mean post-test score

for children studying with radio in the first grade was 55.1, compared with 34.1 for students in the control classes. In the second grade, the mean post-test score for the control group was 74.2. Second graders who had studied one year with radio attained a mean post-test score of 78.6, while those who had studied two years with radio scored 85.6. A similar progression was found in grade three, in which the mean post-test scores for control, one-year and two-year students were 56.0, 67.4 and 73.0 respectively (Searle, 1978, p. 2). These results and the trends demonstrated by them provide clear proof of the project's effectiveness. Together, they also substantiate a conclusion reached two years earlier by the project's leaders that they had 'moved from uncertainty to confidence in radio as a medium for elementary mathematics instruction' (Searle *et al.*, 1976, p. 154). An equally satisfying result was the reaction of the initial group of classroom teachers who, having worked with radio for one or more years, all requested to be reassigned to radio classrooms in 1976.

Costs were also monitored continuously throughout the early years of the project. Leaving aside the start-up costs (approximately $335,000) as well as annual project administration and research costs (approximately $177,000), the team attempted to itemize the cost of preparing 150 radio lessons. Although such costs are obviously unique to Nicaragua and could be expected to vary widely elsewhere, they do provide useful information regarding the relative financial weight borne by different elements of the system as illustrated in Table 4.

TABLE 4. Costs (in dollars) of radio lesson production and distribution, Nicaragua Radio Mathematics Project

Curriculum design	16 200
Script writing	41 200
Recording costs	12 600
Supplementary materials	6 500
Formative evaluation	19 700
Management	19 700
Support and facilities	8 200
Total	160 000
Cost per lesson	1 070

Source: Searle, 1978, p. 14.

In analysing and projecting the costs of the radio system, the economists working with the project were careful to note the add-on nature of the innovation. Unlike other technology projects, which have attempted to offset costs by increasing class size or using less qualified teachers, the Nicaraguan experiment called for no major modifications in the traditional classroom environment. In other words, it would have to justify itself solely in terms of the improved quality of mathematics instruction and achievement.

Depending on the assumptions made with regard to the distribution of electricity to power the radios and the size of the student population, the economists estimated that, once the lessons were developed, the cost per student per year in grades one to three would range between $0.50 and $0.75. In higher grades, the costs would rise because of the sharp fall-off in enrolments experienced at those levels. However, the economists concluded that such costs should remain well within the budget constraints of Nicaragua. Assuming that the mathematics curriculum is up to date and not in need of major revision, it is clear that the meticulous development and evaluation procedures resulted in an instructional package that was well attuned to the entry skills of Nicaraguan first-graders and in need of only minor modification on a year-to-year basis.

Another factor affecting educational costs in most developing nations is the high rates of student attrition and repetition. In the rural schools of Nicaragua, for example, one-half of the total enrolment was in the first year. Preliminary analysis of the radio project's effect on enrolments indicated a lower rate of repetition in the first grade. If such a trend holds up, the average cost of producing a sixth-grade graduate will decline in Nicaragua. The resulting savings could then be applied to help offset the add-on cost of an expanded instruction radio system.

In February 1978 the Nicaragua Radio Mathematics Project entered its fourth year of service, serving grades one to four in the Masaya district. There were also strong indications that many teachers outside the Masaya District were using the radio broadcasts. This pattern of growth was shattered later in the year when revolutionary activities swept Nicaragua, bringing schools as well as other public programmes to a standstill. At the time of writing, it was unclear when the schools would reopen and, when they did, what role radio would play in the future of Nicaraguan education.

Despite the uncertain status of the Radio Mathematics Project in Nicaragua, it is clear that the accomplishments of the past five years have a great deal to offer other countries seeking to upgrade the quality of their educational systems through the application of instructional radio, both in and out of school. In some instances, the materials developed in Nicaragua may prove easily adaptable to the primary-school systems of other Spanish-speaking countries. What should prove of even greater and more lasting value to an even larger number of countries, however, are the curriculum development, production and evaluation techniques refined by the project's staff over the past five years. Together they constitute an impressive example of what can be done with radio, provided there is enough time, money and people to do the job well (Suppes, Searle and Friend, 1978).

Mobilizing people for community action: the Tanzanian radio study campaigns

Project origin and rationale. The East African Republic of Tanzania, with a population of approximately 14 million, achieved its independence in 1961. Although Tanzania has remained poor since independence, it has made tremendous strides to improve the standard of living of its people and, in so doing, has become a regional leader and a model for many other African nations.

In spite of a low per capita income, a high rate of illiteracy and the concentration of its population in subsistence agriculture, at the time of independence Tanzania had certain attributes that proved to be advantageous to its future development. In contrast to most other new African States, Tanzania did not have a dominant tribal group. This situation prevented the weakening of the new country through the opposition and rivalry of disenfranchised tribal enclaves. Furthermore, a majority of Tanzanians spoke, or at least understood, Swahili. The unifying power of this language, a language whose stature and prevalence have increased through East Africa in the post-colonial era, is seen in the way the country has developed a strong civic culture and, at the same time, cast off many of the undesired remnants of its colonial past.

An equally important factor in Tanzania's development has been the TANU (Tanganyika African National Union) party. Under the leadership of Julius Nyerere, TANU emerged as the principal

mechanism for both the establishment and implementation of development policies. Within TANU, top priority has always been given to rural and agricultural matters, and specifically to the translation of key political goals such as decentralization, popular participation and co-operation (exemplified in the *'ujamaa'* movement) into viable social programmes.

The guiding principles of Tanzanian Socialism were articulated in the Arusha Declaration of 1967. In this statement, Nyerere emphasized the importance of an ideological and popular commitment to democracy and egalitarianism. An important determinant of such commitment was to be education and, in subsequent speeches and documents, Nyerere detailed plans to expand educational opportunity and to make all educational programmes more directly relevant to the exigencies of village life. With this goal in mind, primary schools were encouraged to institute self-help projects and secondary schools were encouraged to become self-supporting. At the same time, an innovative, radio-based community development strategy was begun to provide information and encouragement to rural adults, many of whom had never attended a day of school. The origin, evolution and key elements of the radio development strategy are discussed below.

According to Hall (1978), the notion of using radio to help provide education and stimulate national development actually arose independently within two organizations located in different parts of Tanzania. The Co-operative Education Centre (CEC) was founded in the north-east part of the country in 1964 to help meet the educational needs of local village co-operatives. It employed radio in conjunction with group-study methods adapted from the Swedish labour movement. In Mbeya, a southern highland region, a comparable project was launched at about the same time by the Institute of Adult Education (IAE) of the University of Dar es Salaam. Drawing heavily upon the experience of Canada's farm forums, the IAE also developed a programme based on radio in combination with local study groups.

Beginning in 1967, a series of regional radio courses were mounted separately by the CEC and the IAE. At the same time, the two organizations began to pool their experiences for the first time. Under IAE sponsorship, the initial radio campaign, *Kapanga ni Kuchagua* ('To Plan is to Choose') was launched in 1969. It was designed to popularize Tanzania's second five-year plan and was

limited to only two regions of the country. Approximately 1,100 people in fifty-five listener groups participated in this first experimental effort.

However, this initial project was sufficient to spark people's imagination and enthusiasm and, beginning in 1970 with the *Uchaguzi ni Wako* ('The Choice is Yours') campaign, Tanzania developed the strategy into a major educational and political force, eventually reaching over 3 million adults. The nature and level of participation in the different campaigns are summarized in Table 5.

Audience characteristics. As mentioned above, the target population for Tanzania's radio campaigns was rural adults (ages 16 to 40) most of whom had little formal education (80 per cent of participants had no more than four years of primary schooling) and little access to up-to-date agricultural information or educational opportunity. In order to stimulate rural development in areas not blessed with abundant natural resources, Tanzania's planners realized that they would have to mobilize whatever human resources were available. To do this, they embarked on a radical land-reform policy which brought together formerly isolated farm families into larger co-operative units known as *'ujamaa'* villages. Such a policy, they argued, would eventually raise national political consciousness and, at the same time, raise productivity through the pooling of local resources. Radio, in this sense, was viewed as a vital political tool which, in addition to providing much-needed information and encouragement, would also militate against what was still regarded as a largely passive and unco-operative peasantry. Radio and the associated community study groups actually exceeded the planners' hopes as they emerged over time as a major force along with the TANU party for the education and unification of rural Tanzanians.

The learning system. Previous experience with radio and correspondence study in Tanzania and elsewhere alerted the IAE's planners to the need to provide mutually reinforcing communication channels within their campaigns. Accordingly, considerable effort was exerted over the course of the campaigns to ascertain the right mix of mass and interpersonal communication techniques. Although outside advisers provided useful guidance in both programme design and execution, all the methods and materials used

TABLE 5. Summary of five radio listening group campaigns in Tanzania

Campaign	Date	Main agency involved	Nature of the campaign	Number of trained leaders	Number of participants
1. *Kupanga ni Kuchagua* 'To Plan is to Choose'	1969	Institute of Adult Education	Pilot project dealing with the second five-year plan, limited to two regions of Tanzania	30–35	1 100 (in 55 groups, 30 of which were spontaneously formed)
2. *Uchaguzi ni Wako* 'The Choice is Yours'	1970	Institute of Adult Education and others	Parliamentary, presidential and local government elections; predominantly in six regions but with some groups throughout the nation	150	3 000
3. *Wakati wa Furaha* 'Time for Rejoicing'	1971	Institute of Adult Education; Co-operative Education Centre; other agencies	To celebrate one decade after independence, to review development in that period; had nationwide coverage	1 854	20 000
4. *Mtu ni Afya* 'Man is Health'	1973	Institute of Adult Education; Ministry of Education; TANU	To promote a national public-health campaign; had nationwide coverage	75 000	2 million (of which only 1 million had been planned for; many lacked radios)
5. *Chakula ni Uhai* 'Food is Life'	1975	Institute of Adult Education; Ministry of Agriculture etc.	To promote a national campaign for (a) increased agricultural production, and (b) improved nutrition	100 000	3 million

Source: Hall and Dodds, 1974.

in the campaigns were perfected over time in Tanzania. They included: the activation and support of a field organization to establish local study groups, the recruitment and training of group leaders, the preparation and distribution of printed study guides and leader manuals, the preparation of radio programmes and spot announcements to recruit participants and to provide information to the local groups on a regular basis, and the use of the postal system to provide feedback from the field to campaign headquarters. According to Hugh Barrett, who served as an expatriate adviser during this period, it was the flexibility and sense of co-operation, as well as the initiative demonstrated by IAE leaders and their staffs, that was responsible for the success of the campaigns (Barrett, 1976).

Despite the goodwill and motivation of the IAE staff, many political and logistical obstacles had to be overcome to ensure that the campaigns would actually take place. At the outset, the support of Tanzania's political leaders had to be assured. This was achieved through preliminary meetings with members of Parliament, officials of various ministries and leaders of the TANU party. Such groundwork paved the way for the interministerial co-operation which was essential to the organization of the field-work and the eventual co-ordination of local development activities advocated in the campaigns.

Local organization was equally important. Here responsibility fell on TANU's network of local leaders and upon existing grassroots adult-education organizers attached to various ministries. In many instances, community-minded volunteers came forward to co-ordinate the local effort. That local effort included the recruitment of study-group leaders (a role played many times by the community organizer), the provision of a meeting-place, and the explanation of all campaign matters to local leaders.

The local group leader played a crucial role within Tanzania's campaigns and, as the campaigns themselves expanded, so did the need to prepare leaders. The fourth and, by many accounts, the most successful campaign, *Mtu ni Afya* ('Man is Health') called for 75,000 leaders to be trained. That job was accomplished in three stages. In the first stage, some 240 regional officers from various ministries were invited to three-day seminars in which they were told how the oncoming campaign related to national objectives and how to prepare district adult-education officers for the

task. During the second stage, district officers received comparable training at some seventy sites scattered throughout the country. The third and final stage consisted of some 2,000 two-day division and ward seminars at which village nominees and volunteers were trained to be study-group leaders. Although the training of group leaders was spread among many persons, the task strained the planning and administrative capacities of the IAE. In retrospect, the campaign's co-ordinating committee concluded that two days was simply not enough time to train group leaders in the use of the multiple methods and materials which were part of the strategy.

In his evaluation of the *Mtu ni Afya,* Hall provides a concise description of how the local study groups, using a combination of communication channels, actually proceeded from learning to action during the campaign:

> Assembling during the prescribed gathering time, group members heard ten minutes of political songs, poems, and short announcements relating to the campaign. Then the twenty-minute core program came on the air, and members settled down to some serious listening. Next, the group leader or another literate person in the group introduced the printed material on that week's topic by reading aloud from the appropriate section of the study guide. Discussing both the radio shows and the written materials, the group related the topic to its own particular area and circumstances. If the information presented seemed relevant, members set about resolving how to prevent the disease or eliminate the health hazard in question. Before the next meeting or perhaps later, the group began acting on their resolutions, either individually within their homes or collectively in the community (Hall, 1978, p. 39).

The study guides and radio programmes fed into and supported the discussions by local groups which were the heart of the campaign strategy. The study guides were developed by the IAE in conjunction with appropriate government ministries (e.g. education, health, etc.). These were selected and sequenced according to the anticipated schedule of weekly meetings. Vocabulary and type faces were chosen so as not to strain the capacity of rural readers, many of whom were barely literate.

The same care was taken in the preparation of the group leaders' manuals. Their purpose was to guide the group leaders in the running of each study session. Accordingly, each manual contained detailed guidelines for each meeting and a complete schedule of the

radio programmes associated with each campaign. In addition, notes and suggestions for organizing local study groups and for recruiting participants were included. Finally, in the later campaigns, a tear-out form was added to the manual. Here the local leaders were asked to enter information about the participants: name, age, sex, education, occupation and attendance level. These forms were returned to the IAE, where they eventually formed an important bank of feedback data.

The weekly radio programmes also served multiple purposes. First, they provided vital structure and momentum to the campaigns. Leaders and participants knew in advance what subjects would be treated by the weekly half-hour broadcasts and this knowledge encouraged them to keep going and to keep their follow-up activities and projects on schedule. Second, the radio programme brought to life the development themes and problems of the campaign. Whenever possible, the programme featured recordings by villagers about their own experiences and expectations. This 'local flavour' enhanced both the authenticity and immediacy of the communication. Towards the end of each broadcast, the salient points were reviewed by some official who also provided some specific suggestions for possible follow-up action at the local level. In this manner, the radio complemented and reinforced both printed messages of the campaigns and the actions of the local leaders. Finally, the radio programmes served as indirect publicity for the campaign —a function that was important in maintaining support for the undertaking among Tanzania's decision-makers, most of whom were located in the capital, Dar es Salaam, far from the centre of action in the rural areas.

Scale and duration of impact. With the exception of Hall's 1978 study of the *Mtu ni Afya* campaign of 1973, few hard (e.g. quantified) data exist with respect to the impact of Tanzania's radio study campaigns. In spite of the care Hall himself took to gather reliable field data with which to compare participant versus non-participant communities, the author points out that control procedures were extremely difficult to maintain during the campaign. Thus, he argues, comparative judgements must be seen as more suggestive than definitive. In spite of such warnings, however, the author argues convincingly that *Mtu ni Afya* was a resounding success. On the average, study-group participants demonstrated a

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percentage knowledge gain score in health of almost 47 per cent (from 43 to 63 per cent). Such a gain was statistically significant at the 0.01 level (Hall, 1978, p. 52).

Because the improvement of rural life was the ultimate objective of the last two and largest campaigns (see Table 5), Hall and others concentrated their studies on the ways campaigns have actually changed the lives of rural Tanzanians. Here again, Hall's data on the 1973 health campaign are most illuminating. Working with collaborators at the IAE, he developed a checklist of pests and stagnant water pools, the removal of vegetation and rubbish from around rural dwellings, and the construction of latrines to meet strict sanitary standards. Surveying in depth every home in each of eight sample villages, Hall found considerable variation on most of the indicators. Such variation stemmed in part from both regional and economic differences; in some areas the cost of implementing recommended practices was too high.

On one indicator, however, the implementation rate was phenomenal. Post-campaign measures of latrine construction revealed an increase of 570 per cent in the eight sample villages. Although many latrines were not constructed to the precise specifications contained in the campaign materials, it was evident to planners and evaluators alike that this one innovation had been widely adopted throughout the nation. Estimates place the total number of latrines built during the health campaign at over 700,000. As Barrett noted in his analysis of the health campaign, the latrines stand today as permanent, if half-buried, monuments to the effectiveness of the radio study method.

The data presented in various evaluation studies, stemming from participant observation, various surveys, as well as the direct feedback from listener groups, also illuminated the following series of problems that befell the campaigns:

1. Many groups (50 per cent in the *Mtu ni Afya* campaign) lacked radios and therefore had to rely exclusively on the study guides or the leaders' manuals.
2. There was a shortage of study guides and other campaign materials because of faulty distribution procedures and long delays in learning about or responding to shortages.
3. The average study group size was too large, approximately twenty-five to thirty-five in most regions. Such large numbers impeded small group discussions and lowered the participation

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rate of individual members.

4. The amount of inter-institutional co-ordination needed to plan, execute and follow up on the campaigns occasionally failed to materialize. This in turn prevented local groups from making recommended changes owing to the lack of ancillary support materials and equipment.

Despite these problems, however, the Tanzanian radio campaigns were successful. In the final analysis, some of the reasons for this success are unique to Tanzania, while others probably could be replicated or adapted for use elsewhere. It is worth remembering that the campaigns required very little new capital investment and no new communication technology. Existing technologies—radio, newsprint and post—were modified to meet the needs of newly co-ordinated adult-education, political and administrative services.

The intensive-campaign approach, partly modelled on the experience of Cuba and other socialist countries, was itself a major reason for Tanzania's success. Adult educators and development workers in Tanzania and many nations have experienced difficulty in maintaining participants' interest over time. This realization prompted Tanzania's planners to define more modest and short-term objectives for the campaigns and to limit the time in which they expected to hold the interest and motivation of their audience. Furthermore, the participation of a variety of government institutions was facilitated by the limited duration of the campaign. For many of these institutions, adult education was a secondary concern, and while they would not have been willing to reallocate their resources to a permanent educational programme, they proved more than willing to co-operate on a limited short-term basis. The fact that such institutional co-operation did not accomplish all that it was expected to was a function more of inexperience than anything else.

Perhaps the most significant feature of the campaigns was the close relationship between educational and political objectives in Tanzania that has emerged since the country's independence. The value of participant, study-group methods, especially within a nation striving to build political awareness and commitment to a new political system, is obvious. In all the campaigns, whatever their focal development themes, political education was high on the agenda. The undertaking and acceptance of socialism, by peasants as well as development workers and bureaucrats, constituted the

integrating theme and guiding purpose of the campaigns. Without the support of the TANU party at all levels, the campaigns would not have reached so many people, would not have had the authority or the legitimacy to organize people at the local level, and would not have benefited from the active intent and support of so many government officials.

Diffusing innovations: the Indian Satellite Instructional Television Experiment (SITE)

For some time, planners of non-formal education and diffusion strategies have recognized the power of communication media to reach mass rural audiences. Accordingly, substantial resources have been allocated to adapt radio and television to the perceived needs of various development agencies such as agriculture, health, family planning, etc. When backed up by genuine political commitment and the mobilization of other development resources at the regional and local levels, these media have had an impressive impact, an impact leading to substantive improvements in the quality of life for local people. However, in most instances, the planning and administration of mass-media projects have been incomplete, relying more on the attractiveness or novelty of the media themselves than on carefully thought-through and integrated rural-change strategies. This had resulted in many short-lived projects and a general disillusionment with regard to the real benefits and ultimate beneficiaries of large investments in media.

The debate over investment in communication technology for development has reached a new poignancy with the advent of satellites and the potential for receiving radio and television signals directly from space. It is now feasible for centrally conceived and produced messages to be distributed simultaneously throughout large geographic areas without relying on extensive relay or retransmission facilities. Such a capability vastly increases the potential audience for development broadcasts of all kinds. Conceivably, satellites may soon permit nations to circumvent the development of extensive terrestrial communication systems. However, with the advent of satellites have arisen new planning issues related to the sovereignty and control of this powerful new form of communication. It is in this light that India's Satellite Instructional Television Experiment (SITE) offers some useful guidelines for the future.

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Project origin and rationale. The impetus for the SITE came from India's scientific community and not from its educational or development establishments. Recognizing both the distributive power and potential cost savings of communication satellites, the late Vikram Sarrabi, director of the Indian Space Research Organization (ISRO), convinced his government in 1967 that the time and technology were right for a large-scale experimental effort that would:

1. Develop a national television system able to provide equal opportunity for both urban and rural dwellers;
2. Promote national unity;
3. Enhance understanding on how to design a satellite television system for educational, political and economic ends; and
4. Provide general guidelines for India and perhaps other countries in all the above areas.

Under terms contained in a Memorandum of Understanding signed between the United States and India, the United States agreed to provide one of its applied-technology satellites (ATS) to India for a one-year trial. In this agreement the United States, through its National Aeronautics and Space Administration (NASA), also agreed to assume responsibility for the launching, positioning and maintenance of the satellite. The Government of India assumed control over all remaining aspects of the experiment, including the design and deployment of all ground transmission and reception systems as well as all software materials.

For various reasons, the experiment did not gain much momentum for five years. However, the pace of activities accelerated in the early 1970s. Once the ATS-6 satellite was launched, in May 1974, and a firm date established for the commencement of service to India (1 August 1975), development activities in India reached a feverish pitch.

SITE's planners believed from the outset that a communications satellite was particularly well suited for the distribution of television signals through India. The size of the country, the dispersion of her population, and the costs previously associated with the medium had prevented television from spreading beyond a few urban enclaves, although radio had been widely distributed via a national network (All India Radio) for some time. While political concerns were not foremost in the minds of the scientists who first proposed the project, the development of a national and highly centralized

television service was clearly compatible with the internal emergency measured declared by Prime Minister Indira Gandhi just thirty-four days before SITE broadcasts were scheduled to begin in August 1975. The national programme broadcast each evening from Delhi proved a convenient means for the government to expose its policies and programmes to villagers in the participating states.

Audience characteristics. SITE broadcasts regularly reached 2,332 villages located in six states. The states were selected because of their relative backwardness, although participating communities were required to have electricity, a secure public building (generally a school or community hall) to house the television set and reliable approach roads to facilitate installation and maintenance. The potential for continued television service constituted another village selection criterion; districts selected were those in which ground transmission facilities could be expected to pick up where SITE left off after the initial, year-long experiment.

The size of SITE villages varied from 600 to 3,000 people with an average of about 1,200. In total, therefore, about 2.8 million rural Indians had access to SITE programming, although the actual daily audience stabilized somewhere between 170,000 and 200,000 (approximately 75–100 viewers per village) according to most reports. Such stabilization occurred only after the initial month of television broadcasts in which the novelty of the medium was credited with occasionally attracting audiences of over 2,500 to a simple community receiver.

Audience analyses undertaken by the SITE evaluation unit suggest that the variations in audience size and composition were due to several factors, including:

1. *The occupation mix found in the villages:* market villages populated by a high proportion of traders and craftsmen had lower attendance levels than farming villages;
2. *Proximity to urban areas:* remote villages had higher attendance levels; and
3. *Location of the community receiver:* placement of the set in a central location generally resulted in higher attendance.

The evening audience for SITE broadcasts was composed of approximately 50 per cent adult men, 20 per cent adult women and 30 per cent children. People of all castes attended, although the researchers reported a negative correlation between socio-economic status and

viewing. Apparently, landowners and other privileged people in the communities did not enjoy sharing the viewing experience with lower-class groups, labourers and others. Other factors which limited the participation of relatively well-to-do farmers were apparently the lack of escapist, entertainment material, prior knowledge of the instructional content of the programmes, or the availability of such content elsewhere (Mody, 1978, p. 8).

Village children constituted a larger component of the SITE audiences than was initially expected. In addition to the daily in-school programmes, which were specifically targeted for children of ages 5–12, children proved to be faithful members of the evening audience as well. In most SITE villages, children crowded close to the television set, often forcing adult viewers to stand to one side or to the rear. This pattern was a source of surprise and concern for SITE planners, whose choices of development themes were not originally made with children in mind. As the Experiment progressed, more children's programming was produced in response to this situation.

The learning system. As mentioned above, SITE was a collaborative endeavour, sponsored by the United States and Indian Governments. Despite strained political relations governments managed to fulfil all their commitments to the project. Within India, responsibility was shared by various agencies. The Indian Space Research Organization (ISRO) was responsible for designing, deploying and maintaining all ground equipment involved in the transmitting and reception of SITE programmes. The programmes were transmitted to NASA's applied-technology satellite (ATS-6) from two earth stations located at Ahmedabad (ISRO headquarters) and Delhi. The satellite amplified the television signal and returned it to earth where it was received by small antennae linked to each of the village television receivers.

SITE was the first large-scale communications project in which television programmes were received by local viewers directly from space. Although rediffusion of satellite signals via conventional VHF transmitters was used for some urban viewers who had access to standard television sets, the vast majority of rural viewers received the programmes by means of special community sets. These sets were actually conventional receivers manufactured in India that were fitted out with a special antenna and a pre-amplifier

converter. Each set also had a mechanism that permitted viewers to select between two language tracks. The total unit cost of these special community receivers amounted to approximately $1,000.

Doordarshan, India's national television authority, was primarily responsible for SITE programming. Broadcasts destined for the six participating regions of the country were videotaped in four languages at SITE studios in Delhi, Cuttack and Hyderabad. Various government ministries (i.e. agriculture, health, education, etc.) specified appropriate topics and provided consultants to assist in the design of programmes.

A typical broadcast day began with a 22½-minute morning broadcast to schools. This programme contained a mixture of entertainment and information segments designed to enrich a young audience's school experience rather than provide it with direct, curriculum-based instruction. Two of the six morning programmes contained science modules produced by ISRO's experimental software group in Bombay.

SITE's two and a half hours of evening broadcasts were divided into four time slots. Three of the slots were allocated to separate, regional broadcasts. During such time, entertainment and development themes were presented using a wide variety of programme formats, including demonstrations, interviews, dramatizations, panel discussion, songs and dances, puppets, and response to viewers' questions. The fourth time slot was reserved for a half-hour national hook-up of news and cultural entertainment broadcast in Hindi. Current Indian affairs and speeches of prominent Indian politicians were highlighted in the news portion of this programme. No time was assigned to the reporting of events outside India.

SITE's production facilities were small, under-equipped and understaffed. These crowded conditions, coupled with the time pressure of producing so many new programme segments each day, led, in many critics' eyes, to an overdependence on entertainment services amounting to little more than the videotaping of various local dance and mime troupes. Such a programming strategy prevented a fuller exploration of the development themes which rural audiences apparently found more interesting. The sheer volume of daily production and the often adverse circumstances under which the production crews had to operate also limited the degree to which audience preferences could be acted upon. According to Bella Mody, SITE's chief evaluator,

> Since production was in no position to physically even glance at such (feedback) research in a healthy frame of mind, there was little time for concern about adequacy for the villagers of what was produced. The concern was to keep the TV monsters fed (Mody, op. cit., p. 7).

As mentioned above, Doordarshan, India's national television organization, was responsible for most SITE programming. However, a separate production and broadcast system was established by ISRO at the Space Application Centre in Ahmedabad to serve the Kheda district of Gajarat, a relatively progressive and prosperous agricultural area. The Kheda 'laboratory' as it came to be called, was actually an experiment within an experiment, a means for exploring innovative programme design and production techniques. ISRO's leaders recognized that while SITE facilitated the simultaneous broadcast of programmes to different regions of India, there were viewing instances when it might be more appropriate to provide programmes of more local interest and applicability.

Kheda programmes were designed not only to provide villages with new information, but also to enhance both horizontal and vertical communication within villages, and between decision-makers and the masses. The daily telecasts consisted of 'national programming' from Delhi and local programmes prepared especially for the Kheda district's needs. The local programming contained a variety of formats. About 20 per cent was 'hardcore' instruction in such areas as agriculture and health, 30 per cent was children's programming, 25 per cent was 'soft-core' programmes such as drama, involving social-change objectives. The remaining 25 per cent consisted of news, song and dance, and miscellaneous programmes. The national programming was in Hindi; the rest was in Gujarati, the local language.

A second objective of the Kheda project was to gain experience in the design and management of a limited rebroadcast system, one using both terrestrial and satellite components. This objective was accomplished, and despite the termination of satellite broadcasting in 1976, the Kheda 'laboratory' has continued operation, using only terrestrial facilities, since that time.

Systematic utilization (e.g. reinforcement) efforts at the local level might have enhanced SITE's impact but such activities (and the budget to sustain them) were never planned for on a large scale. There was no follow-up, there were no listening or discussion

groups, and there was no attempt to co-ordinate the programming with other activities sponsored by India's development ministries. A small utilization experiment was conducted in five villages within each participating region, however. In these 'utilization villages', four programmes were selected each month for intensive follow-up effort. Printed materials containing supplementary information were provided, together with discussion and demonstration by local leaders and change agents. To the extent possible, attempts were made to make some of the innovations (fertilizers, credit, etc.) presented in the broadcasts more readily available to the villagers. While these measures appeared to increase the rural viewer's disposition to change in the final analysis, they served more to illuminate the need for such activities and services throughout the system than to bring about any long-lasting changes.

Scale and duration of impact. An important attribute of SITE was the extent to which researchers were involved in designing, implementing and assessing the impact of the project. In addition to ISRO's research scientists, who developed all hardware components of the systems, except the satellite, a social research staff of over one hundred people was recruited. Its activities include both *formative* research to guide decisions that had to be taken during the life of the project and *summative* research to assess the affects of the experiment and to guide follow-up activities.

SITE's formative research programme was divided into three categories:

1. *Context evaluation,* which consisted of audience profiles and the conduct of needs assessments;
2. *Input evaluation,* which consisted mainly of pre-testing of prototype programmes; and
3. *Process evaluation,* which embodied an extensive ongoing feedback system as well as numerous short-term studies on specific programmes.

Although the results of these various evaluation strategies were presented regularly to programme designers and producers, the pressure to keep up with an extremely demanding production schedule reduced the producers' ability and willingness to incorporate such information into their day-to-day operations (Mody, op. cit., p. 8).

The summative-research programme included two major sample

surveys of programme impact, a series of 'holistic' anthropological studies, a programme inventory and content analysis, and a number of in-depth studies of particular issues. The surveys examined the impact of the programmes directed at children and adults. They were designed to chart changes in viewers' knowledge, attitudes and behaviour and to relate such changes to certain socio-economic variables. It was expected, for example, that children who viewed SITE's school broadcasts would not only achieve more than their peers who were not exposed to the programme, but that they would also show improvement in school attendance, language development and overall interest in acquiring knowledge. Furthermore, it was expected that teachers would have positive attitudes towards the use of television in the schools. To examine these hypotheses, a random sample of some 100 participating children and their teachers from each of the regions served by SITE was compared with an equal number of students and teachers from communities without television.

Comparisons of children's language development confirmed the researchers' expectations; students in classrooms served by SITE improved more than non-participating students in forty-six out of forty-eight comparisons. Significant differences were reported for thirty-three of those comparisons. An important regional difference was also revealed in the data analysis; students in areas served by a SITE broadcast production unit who received programmes in their native languages and dialects outperformed students from areas far removed from such production facilities. Although SITE appeared to have no significant impact on improving school attendance, raising achievement levels on standard primary-school subjects, or on the frequency of teacher–student interaction, both teachers and students expressed their enthusiasm for the programmes. In the researchers' judgement, the diffuse, non-curriculum-based nature of the programmes may have been the main reason why no sharper learning differences were uncovered.

In addition to the audience and programming data presented above, the range of studies concerning village viewing of SITE's adult programme produced a wealth of information concerning the project's impact at the local level. Much of that information is, in fact, still being analysed and interpreted. Among the more important conclusions of this work to date are:

1. The statistically significant gain in knowledge of political events

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and preventive health measures and birth-control methods among SITE viewers;

2. The relatively larger gains in health knowledge among females, illiterates and those reporting to be regular television viewers, indicating a narrowing of the knowledge gap in health;
3. The large (though not statistically significant) increase in the proportion of respondents of both sexes who were favourable to the small-family norm; and, finally,
4. The statistically significant gains in modern attitudes and education aspirations, with greatest gains in these areas being exhibited by frequent female viewers.

These findings, although by no means earth-shaking, given the amount of money and energy devoted to monitoring and evaluating SITE, do indicate what better-designed and integrated television programmes might offer rural viewers in the years ahead. A particularly encouraging trend which emerges from a review of the SITE results was the closing which occurred in the gap between privileged and underprivileged social groups. The experiment was too brief to make any definitive conclusions in this area, but indications are that women and lower-class individuals benefited disproportionately from the viewing experience. If so, this result offers hope to those who have previously despaired of ever using the mass media to reach beyond the privileged elements of developing societies in order to serve the greater needs of the rural masses.

In the final analysis, however, SITE remains an extremely instructive technical and managerial success, as opposed to a major breakthrough in educational or development planning. The vision that created and guided SITE was a pragmatic, technical one; and the bulk of the project's budget was devoted to the solution of hardware problems and the installation and maintenance of a sophisticated but reliable communications system. Programme planning and utilization played a secondary role, stemming in part from the priorities and perspectives held by the system's founders and in part from the reluctance of India's established development ministries to share the vision of what such a powerful communications tool might accomplish. In spite of these handicaps, India's SITE experience does provide a vision of what rural communications might become and a much clearer indication than has heretofore been available of the range of administrative and programming challenges that are embodied in so powerful a technology.

IV. Critical issues for planning the use of communication media in education

This section will discuss four planning issues that are pertinent to the use of communication media in education. They are: the democratization of educational opportunity; the quality of instruction and learning; the impact of education through technology on rural areas; and the participation of people in their own education. Each of these issues will be discussed in the light of the evidence presented in the four cases of Chapter III, as well as of evidence from other sources.

Democratization of educational opportunity

One of the common arguments for employing communication media is that they allow for marked expansion of educational opportunity without adding proportionately to the costs that are usually incurred in expanding traditional educational services. Two dimensions of 'educational opportunity' must be distinguished at the outset. The first views *democratization* as a simple quantitative expansion of participants in the educational process. The second is more qualitative in character and concerns expanded opportunity for sectors of a society which have often been excluded from traditional educational programmes, particularly women, rural youth, school drop-outs and other minorities. Such a notion of *opportunity*, implied in the latter, involves enhanced *access* (i.e. the ability to enter a learning system), *achievement* (i.e. the ability to benefit from exposure to that system), *retention* (i.e. the ability to remain in the system over time), *certification* (i.e. the ability to finish a prescribed course and receive some formal recognition for having

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done so), and *application* (i.e. the ability to use any new knowledge or certification to better one's life chances).

Let us first examine the issue of 'democratization' through quantitative expansion (though this is not the most important aspect of the concept) in the light of the four cases reviewed in Chapter III. The fundamental goal of the Radio Mathematics Project was not to expand enrolments but rather to improve instruction and learning at a reasonable cost. Examining other projects that aspired to improve instruction, we find that increased enrolments did occur in both El Salvador and the Ivory Coast when television was introduced into the schools, although such increases were not a direct result of the use of television (Mayo, Hornik and McAnany, 1976; Eicher and Orivel, 1977). In both these cases, increased enrolment occurred through larger class sizes and double sessions or the construction of new schools. Television was relied upon to maintain, and indeed enhance, the quality of instruction while enrolments were increased. We must note that one common denominator of the three previous cases is that they all are add-on projects, that is, media that have been incorporated into regular formal schools without radically changing existing structures.

Distance-learning strategies[1] are another means for expanding educational opportunities, but such strategies do not operate within the traditional structures of schools. Radio Santa María is a relatively successful example of such an approach. Here a primary equivalency degree is earned in home study with radio by individuals who for various reasons are not able to enrol in educational programmes sponsored by the Dominican Government. Another example of a school-based (instead of at-home study as in Radio Santa María) distance-learning strategy is the Telesecundaria project of Mexico. Here learning centres were created with a totally televised curriculum, printed materials and a monitor meeting students regularly (Mayo, McAnany and Klees, 1975). In both the Dominican and Mexican cases radio and television respectively have been key factors in expanding the opportunity to study of rural youths.

Both the SITE project of India and the Tanzanian radio campaigns were successful in expanding educational opportunities for rural adults. The satellite in India allowed access to television programming to hundreds of thousands of people, where no access

1. See footnote on page 21.

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would have been possible otherwise without years of heavy investment in terrestrial communications infrastructure. In Tanzania radio permitted millions of rural adults to participate in two large-scale campaigns in health and nutrition. However, in both India and Tanzania, communicating with mass rural audiences depended on (a) the ability of planners to design messages that could be easily assimilated and (b) the back-up support of other human and material resources.

In addition to numbers that have gained access to education through communication media, it is instructive to ask which social groups have actually enjoyed such expanded opportunities. As noted above, the evidence indicates that in Tanzania and India a large cross-section of the rural population had access. In Radio Santa María, the clientele was rural but from somewhat more privileged social and economic backgrounds. Radio Mathematics had an impact on all children attending primary school, both urban and rural, and it actually seems to have benefited the slow-to-average learners most. Still, the benefit of such programmes generally accrues most to relatively privileged persons in the society who can stay in school. Even radio, which is perhaps the most universally available communication medium, has exhibited a socially biased penetration in many low-income countries (Shore, 1978).

Another danger in many innovative learning systems that use one or more communication media is that while they provide large numbers with a nominal access (through radio listening or watching television) they do not provide the ancillary learning resources and support necessary to ensure students will remain in the system. Many governments may favour such systems because, at the relatively low cost of providing only a media message, they can defend a policy that has provided opportunity for entry of large numbers of students into the system but not the assurance of their completion of studies. Schramm (1977) and Perraton (in press) make attempts to estimate drop-outs from various distance-learning systems, but show that it is difficult to generalize. Although a special television experiment in Niger showed a remarkably high retention for its first four years (Silverman, 1976), there is no convincing evidence from other projects that media-based instruction alone is any more successful in preventing drop-outs than traditional systems. Furthermore, long experience with classroom television indicates that the fascination for the medium soon wears off unless other factors (such

as good curriculum content) are available to keep students interested.

Certification is also an important aspect of educational opportunity. Directors of many technology projects in formal and non-formal education have often had to struggle to procure official certification of their graduates. This was true of Santa María, also of the Mexican Telesecundaria. When certification was withdrawn for a time from a teacher-preparation course by radio in Kenya, the programme lost most of its students until the certification was restored (Perraton, in press). Even with the guarantee of certification, however, there is some doubt whether such recognition might not be considered less valuable than degrees from regular schools. Telesecundaria graduates in Mexico appear to be entering higher academic levels on an equal footing with graduates from traditional secondary schools. Similarly, El Salvador's ETV graduates seemed to do as well as their counterparts from traditional schools (Klees, Tijiboy and Wells, 1978). Nevertheless, planners of distance-learning systems and others employing communication media to expand opportunity need to examine carefully the value of their degrees, both for entry to higher academic levels and in the job market.

To what extent are participants in media-based educational systems able to apply their education to future employment? We need to distinguish between formal and non-formal education on this point, because the goals of the two are frequently quite different. In most formal schooling projects, there is an assumption that having a degree will help one find employment, but this long-term goal is often obscured by shorter-term objectives of better learning, more efficient use of resources, or higher retention rates. The radio mathematics programme in Nicaragua made no explicit mention of the long-term value of a primary degree to employment. Radio Santa María planners seem to be keenly aware of the value of their system's degrees and are largely motivated by the desire to help their students secure better employment. No study has been undertaken to see whether their degrees have helped in this search, however.

In many non-formal education projects, no certification is provided and knowledge gained is assumed to be useful more for the immediate improvement of the participants' well-being. Yet even if technology can enlarge access to useful knowledge (as we have

seen in several cases), it cannot necessarily guarantee that this knowledge can or will be applied. Tanzania's health campaign in 1973 did show evidence of some clear application of new knowledge (750,000 new latrines dug) and some presumed benefits for health. In the Ivory Coast, an adult-education television project had limited applications of its contents, for a variety of reasons (Etaix and Lenglet, 1977); and White (1977) found only limited changes in agricultural and health practices as a result of listening to and discussing radio programme in Honduras. Nevertheless, radio in a Guatemala project (AED, 1978) helped small farmers adopt significantly more innovations than control groups. In another case, radio campaigns of short spot announcements in Nicaragua and the Philippines have had impacts on knowledge and some behaviour changes in nutrition and child-health areas (Cooke and Romweber, 1977). Despite these encouraging examples, most large-scale media projects in non-formal education show less clear-cut results. That technology has the ability of providing information to large numbers of potential learners is evident. What needs to be examined in each case is whether those learners continue to attend to the message, learn from it and can ultimately apply it with some benefit to their personal lives.

Improving the quality of instruction and learning

A number of arguments are frequently raised concerning the quality of instruction in media projects. The teaching effectiveness of the media has been documented in this monograph and in numerous other studies (Schramm, 1977; Jamison and McAnany, 1978). The issue is not really *whether* different kinds of communication media have the potential to teach but *how* they can be usefully applied in particular contexts, given the various constraints of budget and bureaucracy. Let us try to identify some of the more important conditions that facilitate learning with the media.

At the onset, it is helpful to distinguish between external versus internal conditions of the learning setting. External conditions are those not under the direct control of educators. They encompass students' socio-economic background, their class, sex, parents' educational levels, as well as the political and social forces that affect the school system as a whole. Internal conditions are those more amenable to the direct control of educators and educational plan-

ners: instructional design, curriculum development, evaluation, personnel training, management, etc. There are other conditions that are difficult to classify. One is motivation. We can argue that such external factors as health, economic needs of the family, distance to the school, etc. have a decisive influence on learning motivation, but we find that well-run programmes (e.g. ones that teach and provide a successful learning experience) seem to contribute to the students' motivation to learn and to remain in the programme. Wherever it is placed, motivation would seem to be a factor of key importance.

In Nicaragua some of the internal factors that contributed to the success of learning have already been noted. Several factors that we might call external were not noted, however. The team that managed the project was from outside the country. It was experienced in curriculum development and mathematics teaching and it enjoyed an independent budget and the backing of a large bilateral aid agency. To a large extent the success of this pilot programme in teaching mathematics stemmed from its leaders' ability to avoid constraints that have undermined similar undertakings elsewhere. As a consequence, children in the experimental classes were able to learn significantly more than their peers in control classes. About these impressive results there can be no argument. The test of the Radio Mathematics model will be whether it can be used in other places to achieve the same results. Among the special conditions that will affect success at a national level will be the political will of a country and the degree to which members of its national educational bureaucracy understand and are willing to inaugurate all the components of such a system. This, in turn, will depend on the costs to the bureaucracy in terms of authority, workload and status that the innovation demands. Also important will be the widespread teacher acceptance, necessary extra budget for add-on costs and the technical skills in production and management to make a national media system work.

Special conditions and circumstances also shed light on the reasons for Radio Santa María's success in providing quality instruction. Among others was the students' level of motivation. Future students in the same rural areas may not exhibit the same high motivation because the most promising candidates will have passed through the system after a few years and those who remain will be less talented and less likely to take advantage of such learning

opportunities. Also, the organizational efficiency of the project to date is due, at least in part, to the fact that Santa María is a small private group with a great deal more flexibility than the ordinary educational bureaucracy. Finally, the project recruits many of its local tutors from among groups with religious motivation. Transfer of this project to a national ministry of education would almost certainly change the motivational structure of the teachers (as well as the costs) and have different results. Still, similar projects such as the Mexican Telesecundaria have managed to show good results within the structure of a national ministry of education.

These examples do not fully define all of the conditions that might contribute to the improved learning of students in media-based projects. They illustrate, however, the necessity to identify those conditions within each context that can contribute most to the improvement of learning and those that block or slow achievement.

Impact of communication media on rural areas

There is a long and multifaceted debate concerning the needs of rural people and how best to meet them. Recently, educational planners in many nations have had to expand the traditional scope of their interests in formal school systems to large-scale non-formal and adult-education projects that aim at mass audiences. With an increased recognition of the need to improve agricultural productivity and to make more efficient the delivery of social services to rural populations, educational planners have found themselves becoming involved in agriculture, health, nutrition and family-planning education as well as the in more familiar concerns with literacy and numeracy. In one country, a survey revealed that over fifty government agencies in addition to the ministry of education were providing some kind of education and training for rural people. The subsequent work of planners in this instance was to try to co-ordinate all of this activity into a coherent educational effort for rural audiences.

Communication technology used for educational purposes in rural areas has a history that dates back more than thirty years in many countries. At the beginning, radio and printed materials were used in simple ways to reach rural populations. In recent years technology has been called upon to help meet diverse informational and instructional objectives. All four of the cases discussed in Chapter

III were wholly or partly rural in focus. Radio Mathematics was tested in rural as well as urban areas of Nicaragua; Radio Santa María specifically aimed at rural audiences; Tanzanian campaigns reached mostly rural audiences; India tested its satellite for delivery to 2,400 villages in the rural areas. There are a large number of other cases where the primary audience of educational technology projects is rural: Mexico's Telesecundaria (Mayo, McAnany and Klees, 1975); Radioprimaria (Spain, 1977) and radio for the Tarahumara indigenous people (Schmelkes, 1977); out-of-school television in the Ivory Coast (Lenglet, 1978); Senegal's *Radio Educative* (Cassirer, 1977); Honduras's radio school (White, 1977); and in many other countries.

We can summarize these broad experiences in terms of four main goals for which communication media have been applied: mobilization; information; education; and co-ordination. Our case selection illustrates each one of these functions to a certain degree. The Tanzanian campaigns are a good example of mobilization; SITE best illustrates the information goal of providing small farmers with information about new agriculture practices; Radio Mathematics and Radio Santa María had comparable educational goals but these systems also illustrated how important is the co-ordination of a complex system in achieving learning results. In the following paragraphs we will provide some additional examples of projects that have worked primarily in rural areas.

Mobilization. Reaching a large number of people to bring them together to achieve some collective purpose in action is one definition of mobilization. The mass media seem to be natural tools for this purpose and they have been called upon frequently for this task. However, one of the problems with the mobilization strategy for many low-income countries is that it has political consequences in sensitive rural areas where problems of inequality are most manifest and when people mobilized for one purpose begin to gather momentum for others. Brazil's radio schools called MEB (Basic Education Movement), begun in 1961, gained great momentum in the first three years of their existence, enrolling over 100,000 *campesinos*. This movement was cut short by the 1964 military *coup* because of its political undertones (DeKadt, 1970). Honduras used radio to incorporate some tenets of Paulo Freire's pedagogy but it failed to translate education into social action at a crucial time

(White, 1977). Senegal inaugurated broadcasts on radio for peasants and a feedback system for telling their problems to government decision-makers. Although some significant political impact occurred, the mobilization of rural peoples' interests was soon dissipated (Moulton, 1977; Cruise-O'Brien, 1975). A private group in the Ivory Coast adopted a French approach called *animation rurale* to mobilize rural people to solve their own problems but was forced by government to disband the effort (Elliott, 1974). These examples underline the fact that mobilization implies not only learning but the active application of that learning in the social and political realm.

While communication media unquestionably have the ability to reach large audiences in rural areas, they also run the risk of creating an awareness of problems without providing any mechanism for solving these problems. Since many of the problems stem from the inequitable distribution of wealth and power in society, those in power see education which makes people more aware of the problems as a threat and react against it. Two conditions for using the media for mobilizing rural people seem to emerge from the experiences of the cases cited. The first is a secure political power base for freedom of action in carrying out mobilization goals. When government endorses such mobilization, as was the case in Tanzania, such a condition is fulfilled; but when the originator is a non-government group and the mobilization is likely to touch upon rural problems in any depth, then adversary conditions are almost inevitable and a power base is needed to survive. The second condition is that the media are only a part of any mobilization effort and that a critical condition for success is the organization of people. In other words the media alone are rarely if ever sufficient mobilizing agents.

Information. There is some debate in education about the distinction between formal and non-formal education. There is also a debate over what is education and what is merely information. This is an important question in areas where communication and education overlap because the mass media are often dismissed by traditional educators as mere transmitters of information. The question may justifiably be asked whether or not a farmer listening to a daily broadcast on how to improve his farming technique is actually engaged in an educational experience. Regardless of

whether one sees this learning as different in degree or in kind from courses in agronomy in an agricultural school, educators are being called upon more and more to help rural people learn a number of important new contents and skills outside the familiar classroom situation.[1]

A number of technology-based rural programmes are providing people with information that they can apply immediately to their daily lives. The SITE case, discussed above, provided farmers with such needed information. Similarly, the Basic Village Education project in Guatemala, (AED, 1978) provided carefully prepared agricultural information to farmers by radio. Other examples are found in the nutrition and health campaigns mounted in the Philippines and Nicaragua to teach mothers of very young children how to improve nutritional and health practices (Cooke and Romweber, 1977). All these cases involved the delivery of simple information on a regular basis for application to daily practices through the medium of radio or television.

A useful distinction can perhaps be drawn here between information that is provided for immediate versus longer-term use. In agriculture, health, nutrition, family planning, etc., the criterion for evaluating an information campaign is not whether the audience listened and learned (though these are necessary conditions) but whether they were able to apply the knowledge to any significant degree. Educational planners who are accustomed to measure learning as the final outcome of most projects have to rethink some evaluation criteria from formal schools to see cognitive learning as but one step in the process.

If the media have not lived up to the planners' hopes for helping rural people to improve their lives, the former must be prepared to examine not only how the media were employed but also the obstacles that were present in the environment to prevent learners from applying the information. Information by itself is not enough to assure applications of new knowledge because such application frequently requires additional resources (tools, credit, even more

1. There is a good deal of disagreement about the rôle of information in rural development, especially in agriculture and health, and the intermediate influence of education, for instance. For a somewhat more positive view, see Lockheed, Jamison and Lau (in press) ; for a more pessimistic view see the chapters in Emile McAnany (ed.), *Communication in the third world : the rôle of information in development* (New York, N.Y., Praeger, in press).

time) that are not available to poor rural people. Another obstacle may be that the messages are irrelevant to the rural audience since they often convey the biases of urban educators and media producers who do not understand the mentality and daily needs of rural people. Finally, even if messages are relevant and can be applied without further resources, they still may not reach the poorest rural people because for them even a radio may be too expensive (Beltran, 1974; Shore, in press).

The role of information in rural development is undoubtedly important. It has not been the purpose of the previous discussion to cast doubt on this, but rather to indicate that the task of the media is formidable in overcoming the obstacles. When the conditions are favourable, as we have seen in several of our cases, the impact can reach a large audience in the rural areas. Again, as we observed regarding mobilization, the impact of the media will generally be due not to the media alone but rather to the human and material resources that surround their application.

Education. For more traditional educational tasks like literacy, numeracy and other specialized cognitive skills, communication media have been used for a number of years. Radio Santa María illustrates a successful use of radio to provide instruction to rural people where none existed before. Yet it also illustrates the contradictions that rural education contains. We have seen from White's study (1976) that the distance-learning classes provided an effective and relatively cheap instructional system for almost 20,000 primary students every year. What is also clear, however, is that many students, once they obtain their degrees, plan to migrate to urban areas to look for employment. The net effect of good education is to draw off some of the best local human resources and leave rural areas worse off than before. A similar finding was reported in two studies in Mexico, where communication helped provide education to rural youth (Mayo, McAnany and Klees, 1975; Schmelkes, 1977). What these experiences show is that education, whether employing communication media or not, cannot of itself overcome many of the rural areas' most pressing problems.

For adults who are settled in rural areas and have less incentive to migrate, there is need for education in cognitive subjects (literacy and numeracy) as well as in applied subjects (agriculture, health, nutrition, etc). The record for the use of technology in rural educa-

tion is a long one and its use in non-formal adult education is looked more to now than ever (for the long history of radio's role in this see: McAnany, 1973; Spain, Jamison and McAnany, 1977; Jamison and McAnany, 1978). Perhaps the best way to summarize both the accomplishments and problems of communication media in rural adult education is briefly to examine an important example, namely, the radio school system in Latin America.

Begun in 1947 with a single small radio transmitter in Sutatenza, Colombia, where a parish priest began to broadcast to his widely scattered parishioners, it has grown to encompass between thirty and forty different radio education projects in almost every Latin American country. This network has been organized into an international consortium (the Association of Latin America Radio Schools) that provides training, research and technical assistance to its member groups. These radio schools focus almost entirely on rural audiences, often broadcasting in native dialects as well as Spanish and Portuguese. Listening audiences are estimated in the millions while organized learning groups that meet regularly were estimated to be about 250,000 in 1973 (McAnany, 1973). The subject-matters vary widely from school to school but literacy and numeracy have been the traditional core of most programmes. Unfortunately, few evaluation data are available, although a large literature about the schools exists but is often not easily available (cf. Beltran *et al.*, 1978, for a useful bibliography). A large-scale study of the schools is getting under way through the international association[1] and this should provide a clearer picture of the different models that underlie the different projects as well as some knowledge of common problems facing them.

A summary of the strengths and weaknesses of the radio schools may be helpful to illustrate the potential that communication media hold in rural adult education. But it should be clear that such a summary will be very superficial and cannot do justice to the rich variety of experience that exists in many different projects.

Among the strong points that radio schools have exhibited are their rural focus, active learning principles, local organization and

1. Sponsored by the Latin American Association of Radio Schools (ALER) with headquarters in Buenos Aires and with funding from the Canadian Government, the study will be a description of the various schools, an identification of the different organizational models that operate in the thirty or so affiliates, and a formulation of recommendations to improve efficiency in their operations.

credibility of their leadership. Radio schools have been dedicated exclusively to the *campesino* in Latin America and so their educational programmes have always had a rural focus that permits adaptation to a specific set of needs that make content development easier. The schools have also consistently used group-learning principles of active participation and discussion. While encouraging learning, local group leaders were members of the same communities as the students. The discussions encouraged members to participate in wider community activities that the radio schools were often involved in at the same time. Since the Catholic Church as the sponsor of the schools has a wide network of parishes in rural areas, it has often been able to build radio schools into already existing local organizations. Finally, the private nature of the schools has allowed them to escape identification with the government and even to stand in opposition at times to government policies when these undercut rural peoples' interests.

There are, of course, problems that radio schools have encountered. These might be identified as an overemphasis on literacy, competition with government programmes, poor internal planning and management, political insecurity and lack of participation by rural constituents. Radio schools, like all other educational institutions throughout the rural Third World, have been uncertain how to treat literacy. For many years it was a narrow, overriding focus, then it was partly abandoned as irrelevant and now seems to be coming back again as an emphasis. But the schools still have not decided how best to make it a useful tool for rural adults who will remain in the rural areas. Radio schools in some places also find themselves competing or overlapping with government education programmes and not finding a unique service to provide. This coupled with problems of security they have regarding the continuation of their licenses for operating radio stations when they oppose the government makes their existence somewhat precarious. Their small budgets have not allowed them to hire trained planners and managers and consequently these areas have suffered. Finally, though there are outstanding exceptions, the schools have created programmes that often reflect a definition of needs by project managers rather than by the participants.

The radio school system is still a potentially powerful tool to serve rural education with communication media. The new study of the system by its international association should provide other

countries outside Latin America with important material for reflection on how media might best serve education needs in their own rural areas.

Co-ordination. As social services are extended to more rural audiences, there is an increased need for co-ordinating and organizing these activities. One of the arguments in favour of using communication media in rural education is that it can reach isolated groups more readily than other means. Santa María, Telesecundaria, and the rural television in the Ivory Coast were all meant to reach new audiences with useful education and information messages. However, as we have seen, merely reaching them with messages will not provide the kind of experience that will lead to acquisition of cognitive skills or to behaviour change. To do this, as our cases have illustrated, a system of field agents, monitors or teachers as well as supervisors is often needed.

As the number of these agents in the field expands with expanding rural services, the need for communication to co-ordinate activities is also greatly increased. Media in this case concern not only the hardware aspects of communication (one-way or two-way radio, telephones, etc.) but an analysis of the human communication structure within the organization. The need for feedback or two-way communication is evident in educational organizations, yet the lack of practice to reinforce the belief indicates that there are serious problems in its execution. The Radio Mathematics case in Nicaragua illustrates how carefully formative evaluation, in the form of frequent student-learning feedback, contributed to a final curriculum that gave such positive learning results. Radio Santa María created a highly effective weekly feedback system (both from field teacher to students and from teacher to headquarters). It developed an efficient system for the delivery of worksheets to the teachers and then to students but also a method for collecting part of the student fees that provided the operating funds for the whole organization. The SITE system was much more complicated and involved a great deal more personnel and equipment, but a feedback system for evaluating television programmes as well as management needs in the field (such as set maintenance) was established and managed to keep the 2,400 widely scattered villages in connection with regional and central headquarters. In fact, what SITE demonstrated if anything, besides the technical aspects of satellite use for televi-

sion, was a management and co-ordination system using communication. Again, Tanzania demonstrated a co-ordination in planning in bringing together education, mass communication, and health agencies as well as the TANU political party in the health campaign of 1973.

What has been or might be the role of communication media in the area of rural education? An analysis of general communication needs will help to focus problems more clearly. Mass communication (like radio, television, print) is generally used in a one-way mode, but two-way communication through telephones or two-way radio is beginning to be discussed as an important factor in rural development (Parker, 1977). Although there is little empirical evidence about the costs and benefits of such systems as yet, the availability of communication through agencies other than education might make the price of use for co-ordinating education services throughout a region, especially with rural populations, of significant value.

Participation of people in their own education

It is in the area of participation that we must raise some general doubts about the role of the communication media in education. Taken as a whole, the use of technology in education generally tends towards centralization and therefore limitation of people's control over their own education. The mass media seem to reinforce a general trend in societies toward centralization, bureaucracy and bigness. As school systems grow, the tendency is towards control and centralization and specialization; all of which makes it harder for people to control their own and their children's education. This tendency is evident in all of our cases to one degree or another. It is perhaps most evident in SITE, despite the effort to make programming reflect local interest and needs more. Obviously, a more careful analysis of participation is called for as well as a look at some smaller-scale technology that allows for greater local control and participation (in this regard, see O'Sullivan and Kaplun, in press).

The degree of participation of people in communication technology used in education has received some consideration in recent years by a number of authors (Evans, 1976; Hudson, 1977; Jouet, 1977, and 1979; Kreimer, 1975). The degree of participation that

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people can have in the process runs the gamut from simply getting people involved in a learning activity through a medium like radio (as we find in the active participation of members of the radio study groups in Tanzania) to a local group owning the means of message production for reaching their own local people (Hudson discusses this for a community radio station in Inuit (or Eskimo) villages in northern Canada). In between these extremes are a number of stages that include active response by audiences to messages (as we saw in Radio Mathematics and Radio Santa María); feedback systems for message creation (Radio Mathematics, SITE); feed-forward (Evans talks about a case in Ecuador but similar experiences are available in Niger and Senegal); local non-professionals making their own programmes in their own language and in their own cultural style (several radio schools have this); and a community-owned and controlled radio or television station.

What we observe from these few examples of participation is that one of two things can happen: the less complex and costly media are taken over by local communities for their own purposes but are quickly isolated unless the local community shares genuine power in the educational system; the larger and more complex technologies like radio, television and film are made partially responsive to local needs and interests but they begin to press against contraints for more efficiency by serving larger audiences. As technology becomes cheaper, a greater degree of control can be exercised by local groups that own and are able to use this technology. But we need to end this section on a cautionary note. New technologies are constantly replacing the older but cheaper technology almost as soon as the older technology reaches a wide spectrum of people. For example, it is difficult even to buy black-and-white television equipment in some places, as it has become obsolete with the dominance of colour. Also, communication technology generally reinforces the main trends in a society. If the trend is towards centralization and control, then communication media will be used in such a way as to reinforce this value, whether it be in education or mass entertainment. What we have tried to indicate is the potential for this technology in helping to serve the interests of local communities, but the widespread use of it in this way depends upon a great deal more than the hardware and its financing—it depends upon the educational philosophy and policies that dictate its use.

V. Conclusions and recommendations

This section will briefly refer to highlights and not go into detail. The references given throughout the text provide a good basis for planners further to inform themselves about a series of important planning issues.

Conclusions

1. The mass media can be used to promote a variety of educational goals in different contexts of low-income countries.

2. These goals include:
   (a) Improvement of instructional quality and learning;
   (b) Extension of learning opportunities to previously unserved audiences;
   (c) Mobilization of large masses of people in study campaigns;
   (d) Improving health, agricultural and nutrition practices through improved information and education;
   (e) Improving organization and administration through better one-way and two-way communication;
   (f) Helping to increase people's participation in their own education and development.

3. Constraints of different contexts mean the the *potential* of different communication media cannot always be realized and that planners need to weigh carefully these constraints against potential benefits before projects are undertaken. Constraints include both internal and external, technical and political limitations of the

systems. Several constraints are also closely related to the technology itself and need special consideration in deciding whether to adopt it or not. For example, the tendency towards centralization in many communication-media projects makes greater participation difficult and can only be overcome with careful planning in the use of the particular technology chosen. Also, the ability to reach large numbers of people through a mass medium like radio, for example, needs to be co-ordinated with material and political support for change in rural areas to avoid simply using the technology as an information channel and providing the government with a form of propaganda.

4. There are a variety of media and combinations of technology and human organization that can be adopted to serve different purposes in a variety of national contexts. Planners are needed who understand both the potential and limitations of communication media to plan, implement and evaluate projects that employ such resources best.

Recommendations

1. Planners need carefully to articulate shorter- and longer-term goals in using communication media for education, especially for out-of-school porgrammes, where the goals are not so much learning but the application of that learning to improve life circumstances. We know that in some cases learning, motivation and even behaviour change can take place through the use of mass media, but frequently longer-term goals like improvement of agricultural production, better employment opportunities or real educational reform do not necessarily follow such changes. Planners need to understand that the use of media, if carefully executed, can contribute to a momentum for significant change but is not a direct cause of this change. In the larger mass communications systems of most countries, technology helps to reinforce values that are already deeply embedded in the society; so too, in education, technology tends to reinforce existing values unless explicit value changes are pursued. Planners need to have realistic expectations for communications, based on a thorough understanding of the educational problems and the experience of other projects that have employed the media.

2. Planners need carefully to consider the need for trained personnel in order to use technology effectively in education. Lack of such persons can not only lead to lowered effectiveness but may also, through import of outside experts, lead to a dependency situation in educational areas. Trained personnel are needed at various levels: planners who are acquainted with previous experiences through the research and evaluation literature that has accumulated; administrators who can deal with complex systems of software production, hardware installation and maintenance of field-agent networks; message-design personnel to translate interests and needs of audiences into an appropriate set of messages; production people to put this into artistically and technically appropriate messages; trained researchers to inprove the quality of the adaptation of the content to audience circumstances through formative evaluation; technicians to install and maintain production, distribution and reception. Of these, message design, content development and formative evaluation seem to be the areas where it is most difficult to find prepared people and yet these are areas that past experience indicates are most crucial to an effective media system.

3. Careful economic analysis is needed for the useful application of communication media to education in low-income countries. Questions not only of cost but also cost-effectiveness need to be raised *before* decisions are made to invest in such systems. Cost-benefit questions are also concerned with indirect and social costs which bear on a nation's development goals and the values on which those goals are founded (Gandy, 1975; Jamison, 1977; Jamison, Klees and Wells, 1978; Unesco, 1977; Unesco, in press).

4. Planners in countries where education is attempting to decentralize should promote some experiments in the use of smaller-scale communication media (e.g. audio and video cassettes, etc.) in order to see how these help or hinder people participating more actively in their own education.

5. Educational planners should collaborate with those who direct national communication resources so that the best use can be made of national radio and television systems, satellite reception, mail delivery, the telephone, etc., for a variety of educational and information tasks in national development. Such collaboration is essential

if large-scale projects are to achieve learning goals through communication media. Otherwise, separate communication systems for narrow educational goals within a single bureaucracy will become prohibitive in cost.

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The book

Twelve years have passed since Wilbur Schramm and colleagues under IIEP auspices completed their survey of instructional media. Since that time many projects have been inaugurated. The early optimism and 'can-do' attitude have been replaced by harder realisation of the multiple problems and conditions under which the media can operate successfully for development. More rigorous research (El Salvador, Ivory Coast, Samoa, etc.) is now available to help planners gauge the kinds of goals and efforts required to make media-assisted instruction and out-of-school broadcasting more cost-effective and beneficial to those elements of a population traditionally deprived of education as well as other social services. Given what has been experienced and learned in the past twelve years, it is appropriate for the Institute to review this field again, drawing together planning guidelines for governments that now and in the near future will contemplate expanding their educational services via instructional technology and the mass media.

The authors

Emile G. McAnany is Associate Professor of international communication, School of Communication, University of Texas-at-Austin, U.S.A. Previously, he carried out research and teaching at the Institute for Communication Research, Stanford University, and has conducted field research on media for formal and nonformal education in Brazil, El Salvador, Guatemala and the Ivory Coast.

John K. Mayo is Associate Director, Center for Educational Technology and Associate Professor, College of Communication at Florida State University, U.S.A. He has carried out field research on educational media in El Salvador, Mexico and Nepal.

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